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# HUMAN ORIGINS

## A MANUAL OF PREHISTORY

BY

GEORGE GRANT MacCURDY, PH.D.

RESEARCH ASSOCIATE IN PREHISTORIC ARCHEOLOGY WITH PROFESSORIAL RANK, CURATOR OF ANTHROPOLOGY, YALE UNIVERSITY; DIRECTOR OF THE AMERICAN SCHOOL OF PREHISTORIC RESEARCH

VOLUME II

THE NEW STONE AGE AND THE AGES OF BRONZE AND IRON

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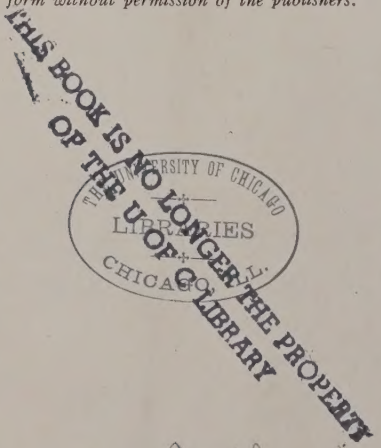


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# KEY TO ABBREVIATIONS

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| *AA* | *Archiv für Anthropologie*, Brunswick, 1866– |
| *AAE* | *Archivio per l'antropologia e la etnologia*, Florence, 1871– |
| *ABB* | *Archives belges de biologie*, Ghent, 1880– |
| *AFAS* | *Association française pour l'avancement des sciences*, Paris, 1872– |
| *AIB* | *Académie des inscriptions et belles-lettres* (*Comptes rendus*), Paris, 1857– |
| *Anat. A.* | *Anatomischer Anzeiger*, Jena, 1886– |
| *Anthr.* | *L'anthropologie*, Paris, 1890– |
| *AP* | *Annales de paléontologie*, Paris, 1906– |
| *APAR* | Piette, *L'Art pendant l'âge du Renne* (100 plates), Paris, 1907 |
| *Arch.* | *Archaeologia*, London, 1749– |
| *AS* | *Académie des sciences* (*Comptes rendus*), Paris, 1835– |
| *ASNZ* | *Annales des sciences naturelles zoölogiques*, Paris, 1854– |
| *BA* | *Bulletin archéologique*, Paris, 1883– |
| *BARB* | *Bulletin de l'Académie royale de Belgique* (*Classe des Sciences*), Brussels, 1836– |
| *BAUB* | *Beiträge zur Anthropologie und Urgeschichte Bayerns*, Munich, 1877– |
| *BMSA* | *Bulletins et mémoires de la Société d'anthropologie de Paris*, 1900– |
| *BSA* | *Bulletins de la Société d'anthropologie de Paris*, 1859– |
| *BSAB* | *Bulletin de la Société d'anthropologie de Bruxelles*, 1882– |
| *BSAHC* | *Bulletin de la Société archéologique et historique de la Charente*, Angoulême, 1845– |
| *BSBG* | *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie*, Brussels, 1887– |
| *BSGF* | *Bulletin de la Société géologique de France*, Paris, 1830– |
| *BSPF* | *Bulletin de la Société préhistorique française*, Paris, 1904– |
| *CA* | Cartailhac and Breuil, *La Caverne d'Altamira près Santander* (*Espagne*) (287 pp., 37 plates), Monaco, 1906 (see *PGMCP*) |
| *CAF* | *Congrès archéologique de France* (*Comptes rendus*), Caen, 1843– |
| *CFG* | Capitan, Breuil, and Peyrony, *La Caverne de Font-de-Gaume* (279 pp. and 65 pls.), Monaco, 1910 (see *PGMCP*) |
| *CIA* | *Congrès international d'anthropologie et d'archéologie préhistoriques*, Neuchâtel, Switzerland, 1866– |
| *CIPP* | *Comision de investigaciones paleontologicas y prehistoricas*, Madrid, 1915– |
| *CPF* | *Congrès préhistorique de France* (*Comptes rendus*), Périgueux, 1905– |
| *CRC* | Alcalde del Rio, Breuil, and Sierra, *Les Cavernes de la Région cantabrique* (*Espagne*), Monaco, 1911 (see *PGMCP*) |
| *DASGN* | *Denkschriften der allgemeinen schweizerischen Gesellschaft für die gesammten Naturwissenschaften*, Zurich, 1829– |
| *DME* | Hoernes, *Der diluviale Mensch in Europa*, Brunswick, 1903 |
| *DVD* | Schmidt, Koken, and Schliz, *Die diluviale Vorzeit Deutschlands*, Stuttgart, 1912 |

| | |
|---|---|
| *HF* | Obermaier, *El Hombre Fosil*, Madrid, 1916 |
| *HP* | *L'homme préhistorique*, Paris, 1903– |
| *JAI* | *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, London, 1871– |
| *JAP* | *Journal of Anatomy and Physiology*, London, 1867– |
| *KB* | *Korrespondenz Blatt der deutschen Gesellschaft für Anthropologie, Ethnologie und Urgeschichte*, Brunswick and Munich, 1870– |
| *MAGW* | *Mittheilungen der anthropologischen Gesellschaft in Wien*, Vienna, 1871– |
| *MAGZ* | *Mittheilungen der antiquarischen Gesellschaft*, Zurich, 1841– |
| *MARB* | *Mémoires de l'Académie royale de Belgique* (*Classe des sciences*), Brussels, 1820– |
| *Mat.* | *Matériaux pour l'histoire . . . . de l'homme*, Paris, 1864–1888 |
| *MSA* | *Mémoires de la Société d'anthropologie de Paris*, Paris, 1860–1899 |
| *MSAB* | *Mémoires de la Société d'anthropologie de Bruxelles*, Brussels, 1882– |
| *MV* | Obermaier, *Der Mensch der Vorzeit*, Berlin, Munich, and Vienna, 1912 |
| *NDSNG* | *Neue Denkschriften der schweizerischen Naturforschenden Gesellschaft* (continuation of *DASGN*), Zurich, 1837 |
| *NF* | *Nordiske Fortidsminder* (publication of the Kgl. Nordiske Oldskriftselskab, with résumés in French), Copenhagen, 1890– |
| *PB* | Breuil and Obermaier, *La Pileta à Benoajan* (*Malaga*), *Espagne*, Monaco, 1915 (see *PGMCP*) |
| *PGMCP* | *Peintures et Gravures Murales des Cavernes Paléolithiques* (publications of the Institut de Paléontologie Humaine), Monaco, 1906– |
| *PM* | *Palæontological Memoirs*, London, 1868– |
| *PP* | Breuil, Obermaier, and Alcalde del Rio, *La Pasiega à Puente-Viesgo* (*Santander*), *Espagne* (64 pp., 29 plates), Monaco, 1913 (see *PGMCP*) |
| *Preh.* | G. and A. de Mortillet, *Le Préhistorique*, 3rd edition, Paris, 1900 |
| *PRS* | *Proceedings of the Royal Society*, London, 1800– |
| *PT* | *Philosophical Transactions*, London, 1665– |
| *PZ* | *Prœhistorische Zeitschrift*, Berlin, 1909– |
| *QJGS* | *Quarterly Journal of the Geological Society*, London, 1845– |
| *RA* | *Revue anthropologique* (continuation of *REA*), Paris |
| *R. Arch.* | *Revue archéologique*, Paris, 1844– |
| *RD* | Buckland, *Reliquiae Diluvianae*, London, 1823 |
| *Rd'A* | *Revue d'anthropologie*, Paris, 1872–1889 |
| *REA* | *Revue mensuelle de l'École d'anthropologie de Paris*, Paris, 1891– |
| *RP* | *Revue préhistorique*, Paris, 1906– |
| *VBGA* | *Verhandlung der Berliner Gesellschaft für Anthropologie, Ethnologie, und Urgeschichte* (appendix for *ZE*), Berlin, 1869– |
| *WPZ* | *Wiener Prœhistorische Zeitschrift*, Vienna, 1914– |
| *ZE* | *Zeitschrift für Ethnologie* (see *VBGA*), Berlin, 1869– |

# PART II

# THE NEW STONE AGE AND THE AGES OF BRONZE AND IRON

# HUMAN ORIGINS

## CHAPTER X

### THE TRANSITION FROM THE PALEOLITHIC TO THE NEOLITHIC PERIOD

The hiatus that was once supposed to separate the Magdalenian Epoch from the Neolithic Period has tended to disappear with the progress of archeological research. The discoveries of Piette have contributed more than those of any other one man to bridge the gap in our knowledge. The initial stage in the transition is now recognized and universally referred to as the *Azilian,* the name having first been employed by Piette.[1]

This new culture takes its name from the station of Mas d'Azil (Ariège), explored by him. It was followed by the *Tardenoisian* culture; in Denmark, Azilian and Tardenoisan are represented by the *Maglemosean* culture. All three combine completely to bridge the gap between the Paleolithic and Neolithic Periods.

The successive steps in this epoch of transition are marked by changes in the lithic industry. The small penknife blades appeared at the close of the Magdalenian and became more numerous during the Azilian; they gradually gave place to a small triangular type of microlithic industry associated with small discoidal scrapers. In the passage from Azilian to Tardenoisian culture, trapezoidal microliths made from long, slender flint blades appeared and persisted until after the beginning of the Neolithic Period. The little flat Azilian pebbles, polished at the end by utilization, sometimes on one side, sometimes on both, and in such a manner as to form a cutting edge, should not be confused with the polishing employed in Neolithic times as a means of shaping and finishing implements.

[1] G. de Mortillet proposed the name *Tourassian,* but it did not meet with favor.

## The Azilian Culture

*France and Spain.*—The type station for the Azilian culture, Mas d'Azil,[2] is on the left bank of the Arise near the point where the river enters its picturesque subterranean passage for a distance of 400 meters (1,313 feet) through a limestone formation (Fig. 255). A great chamber is formed, in part at least, by the river. The first discovery of archeological remains dates from the construction of the national highway from Carcassonne to Saint-Girons (1854), following the right bank of the Arise throughout the length of the cavern. A station of Magdalenian age discovered on the right bank was especially rich in portable art objects.

Fig. 255. The stations of Mas d'Azil, Ariège, France, on either bank of the river Arise.

The Arise flows for a quarter of a mile through a great subterranean passage, the entrance of which is shown here. The type station of the Azilian Epoch is on the left bank of the river, also on the left in the picture. Photograph by the author.

Piette began his excavations on the left bank in 1887 and continued them during the following years. The task was laborious and expensive; he encountered nine different horizons, some of which measured more than 1 meter (39.4 inches) in thickness. Beginning at the bottom, the first five were of Magdalenian age; the sixth, Azilian; and the seventh, eighth, and ninth belonged to the Neolithic, Bronze and Iron ages, respectively. The Azilian layer was characterized by an abundance of stag bones and absence

[2] *Mas* is the patois for *maison,* hence, *maison d'Asyle;* the cavern is said to have received its name from the fact of its having served as a refuge for the persecuted Huguenots.

of the reindeer; by small penknife blades of flint, small discoidal scrapers, pebbles that had served as chisels and paring knives, and flat, perforated harpoons of staghorn; by two sepultures, the burials thought by Piette to have taken place after the flesh had been removed and the bones stained with red ocher; and, finally, by the so-called painted pebbles.

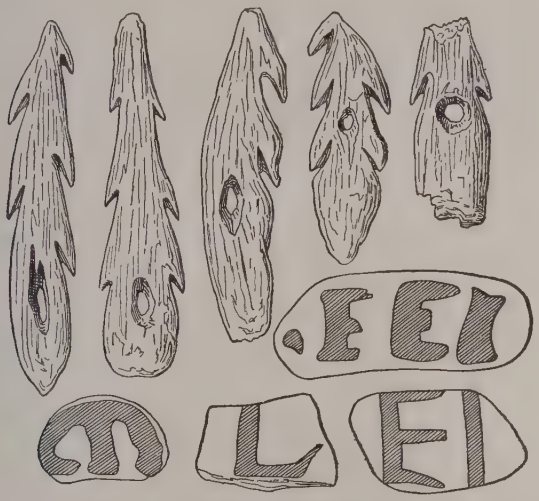

FIG. 256. FLAT HARPOONS OF STAGHORN AND PAINTED PEBBLES FROM MAS D'AZIL. AZILIAN EPOCH.

These crude Azilian harpoons are in striking contrast to the beautifully carved Magdalenian harpoons of reindeer horn (Figs. 99 and 100). The painted pebbles, hundreds of which have been found, are the distinguishing feature of this epoch. They may have been a form of writing; at any rate the symbols bear striking resemblances to the alphabets of less ancient races. Scale, ½. After Hoernes.

While in some respects the lithic industry recalls certain Magdalenian forms, the absence of bone needles, lance heads, and fine harpoons of reindeer horn at once engages the attention. In their stead one finds bone points, crude bone spatulae, and flat harpoons of staghorn often perforated at the base (Fig. 256). The noble and realistic art of the preceding epochs had disappeared.

Among the treasures gathered at Mas d'Azil are the painted pebbles (*galets coloriés*). By 1891 Piette had found more than two hundred. Invited to the site, Cartailhac gathered nine of them

in four days; Boule and Regnault were equally successful. Piette's discoveries called attention to the fact that two painted pebbles, in all respects similar to those from Mas d'Azil, had been discovered as early as 1874 in the cave of La Crouzade near Narbonne (Aude); they are still preserved in the museum at at Carcassonne. In 1891 painted pebbles were found by Chamaison and Darbas in the rock shelter of La Tourasse at Saint-Martory (Haute-Garonne), and later they were reported from various other stations in western Europe.

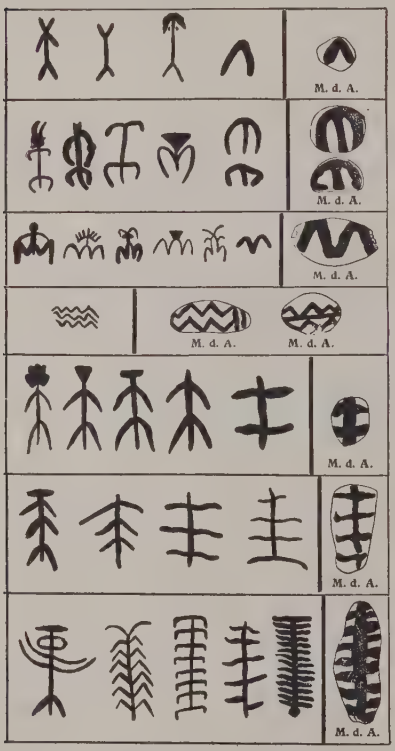


FIG. 257. COMPARISON OF SPANISH PETROGLYPHS WITH THE DESIGNS ON AZILIAN PAINTED PEBBLES.

Many of the Spanish petroglyphs (to the left of the broad vertical rules) coincide with the Azilian Epoch (15,000 to 10,000 years ago). They are stylistic representations of the human form, some male and some female. Scale, *ca.* $\frac{1}{6}$. After Obermaier.

The painted pebbles at Mas d'Azil had been selected from the bed of the Arise, preference being shown for those which were straight and flat. Pulverized red ocher was employed in the coloring; the designs, in part at least, might well have been traced with the tip of the finger, but a small brush of some sort was evidently used in certain cases. The color was thick and might have been fixed by grease, or some other organic substance (Fig. 256).

In the opinion of Piette, these painted pebbles represent a system of cursive writing. He believed that at least twelve Azilian symbols have been handed down from the close of the Pleistocene through the Phœnician, archaic Greek, classic Greek, Latin,

and Lydian. He pointed out a possible kinship between Azilian numbers and those of Egypt.

A few painted pebbles, or stones somewhat akin to those of Azilian age, have been reported from older horizons. In 1922 Gimon published a pebble on which seven approximately parallel red bands had been painted; this pebble came from an Aurignacian horizon in the Salpêtrière cave at Pont-du-Gard (Gard). Several painted stone plaques were found in deposits of Upper Magdalenian age in the Klause caves at Neu Essing (Bavaria). According to Breuil a painted pebble (not yet published) was found by Hauser in the Magdalenian deposits at Laugerie-Haute (Dordogne). Even more remarkable is the complete identity between a painted pebble found by Rivière in the cave of La Mouthe (Dordogne) and those from the type station of Mas d'Azil. Since nothing else that might have belonged to the Azilian Epoch was found at La Mouthe, this pebble probably antedates the Azilian. Since Aurignacians, Solutreans, and Magdalenians, each in their turn lived at La Mouthe —a station also frequented by a Neolithic race, it would hardly be beyond the realm of possibility for an Azilian to have found shelter there long enough to lose a painted pebble, although it is highly improbable.

Breuil is no doubt right in correlating the stylistic mural figures of Spain, especially those of Estremadura and Andalusia, with the painted pebbles of Mas d'Azil. The analogy between the Spanish petroglyphs (principally in Andalusia and the whole of the Sierra Morena) and the painted pebbles is very strikingly exemplified by Obermaier in *El Hombre Fosil*. While some of these petroglyphs date from the Neolithic and even later, a large majority coincide absolutely with the Azilian-Tardenoisian (Fig. 257).

The Azilian fauna is modern, composed of species still inhabiting western Europe. The reindeer had departed toward the north, leaving the stag to take its place. There were as yet no domesticated animals or plants.[3]

*Great Britain.*—The presence of Azilian culture in Great Britain, especially in Scotland, is confirmed by various discoveries.

[3] According to Breuil, the pits of prunes and cherries and the grains of wheat found by Piette in the Azilian horizon at Mas d'Azil had been carried there at a subsequent date by rats.

The most important were made in the caverns at Oban, built on an old raised beach on the west coast of Argyllshire. The principal data are from MacArthur cave, which came to notice in 1894. The deposits were some 3 meters (9.8 feet) thick and included an upper and a lower shell bed. The fauna is recent, corresponding to the Azilian. The cultural remains are characterized by the absence of pottery and the presence of flat harpoons of staghorn, some with and some without a perforation at the base.

The fact that the lower cultural layer was intercalated in gravels of marine origin is proof that it is of considerable antiquity; it dates from a time when the sea level was 9 or 10 meters (29.5 to 33 feet) higher than at present. According to Geikie, the Oban culture can not belong to an earlier epoch than the Upper Turbarian (cold), while he assigns the Azilian to the Lower Forestian (warm). The interval of time between these two epochs "represents a prolonged period, during which two very considerable changes of climate supervened."

The rock shelter of Druimvargie at Oban, discovered in 1898, has yielded remains similar to those from MacArthur cave, both stations evidently dating from the same epoch. At that time the two sites were on opposite sides of a small bay and might well have been frequented by the same band of hunters. The same type of implements that were found at Mas d'Azil (pebbles faceted at one end by abrasion) recur at Druimvargie. Portions of two harpoons of the same type as those from MacArthur cave, but made of bone instead of staghorn and with unilateral barbs, were also found. When it is recalled that harpoons of this type were found at Mas d'Azil, the identity of culture between these Scottish and French stations becomes strikingly apparent. This does not necessarily mean exact contemporaneity, however, since it would have required a considerable lapse of time for a prehistoric culture wave to traverse so great a distance.

The culture of MacArthur cave and Druimvargie recurs in a sort of shell mound, known as Caisteal-nan-Gillean, on the island of Oronsay, not far from Oban. With the exception of the great auk, the faunal remains at Oronsay are those of existing species. Among the implements found were two hundred waterworn pebbles worked at one end and eleven harpoons of deerhorn and bone.

Harpoons of the Oban type have been found sporadically in England. One came from Victoria cave, another was picked up as long ago as 1852 on the shore at Whitburn; in the local museum at Kirkcudbright there is a harpoon of staghorn which was recognized by Dr. Robert Munro (1900) as bearing a striking resemblance to one of the harpoons from Caisteal-nan-Gillean.

### The Tardenoisian Culture

The type station for the Tardenoisian culture is in the open, within the limits of the park of the ancient Château of Fère at Fère-en-Tardenois (Aisne).[4] The site was discovered in 1879 by Judge Edmond Vielle,[5] who found in it a geometric microlithic industry including triangular and trapezoidal forms (Fig. 258); among the latter were the so-called arrowheads with transverse edges (*flèches à tranchant transversal*).

Captain Octobon has recently given much time to a detailed study of Tardenoisian industry, based largely on the important stations of Montbani (Aisne), Le Theil (Loir-et-Cher), Châteauneuf-du-Pape (Gard), and Haussières (Aude). The first he calls pure, or typical, Tardenoisian, the last three late Tardenoisian. Octobon's conclusions regarding the typical Tardenoisian stations are:

The workshops or habitations are in the open on sandy soil.

Microlithic facies and the presence of geometric flints, triangles, trapeziums, arcs of circles, etc.

Diminutive nuclei with two or three striking platforms.

Utilization of chips removed in the process of reshaping the nucleus.

Very few hammerstones.

Blades with base reduced before they were removed from the nucleus.

Industry based on the use of the blade entire, or a fragment of it.

Abundance of scratchers of all kinds.

Small blades recalling in miniature the types of Châtelperron and La Gravette.

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[4] The name *Tardenoisian* was given to this phase of culture by G. de Mortillet.

[5] *BSA*, 4th ser., 1, 959–964 (1890).

Employment of all hard rocks and the utilization of even the insignificant chips.

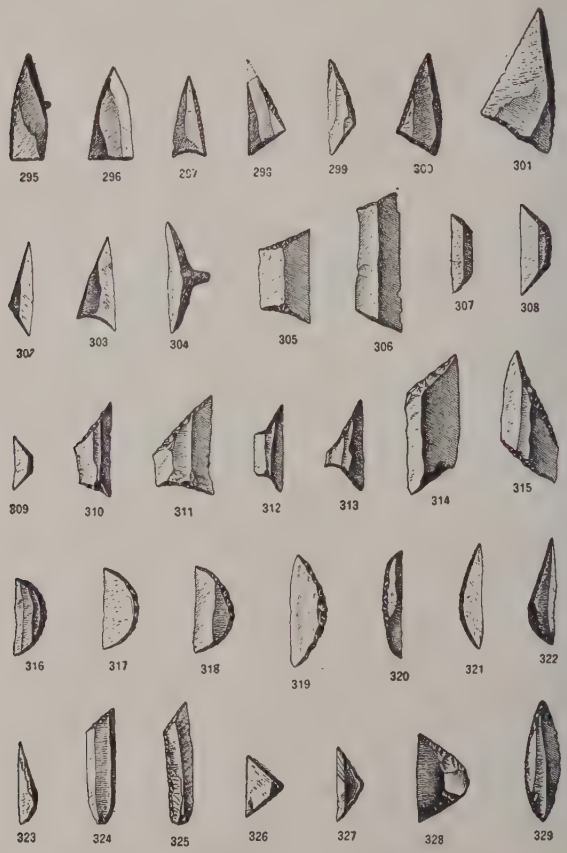


FIG. 258. MICROLITHS OF THE TARDENOISIAN EPOCH.

Many of these were probably fitted to harpoons (see Fig. 260). Nos. 295-306, 310–315, 320–322, 324, 326, 328, are from southern and western Europe; Nos. 317, 318, 325, 329, are from northern Africa; and Nos. 307–309, 316, 319, 323, 327 are from India. Scale, $\frac{2}{3}$. After de Mortillet.

No retouching on the face of the blades.

No typical paring knives (*tranchets*), no special awls, and only very rarely anything suggesting the Neolithic arrowhead.

At present the Tardenoisian phase of the transition epoch does not admit of a very sharp definition. It has elements in common with both the Azilian and the Campignian, the latter clearly Neolithic. Even certain Azilian forms, such, for example, as the flat harpoon of staghorn, are carried over, with only slight variation, into the Neolithic. Pure Tardenoisian culture can be distinguished from Azilian only by the absence of painted pebbles.

### Maglemosean Culture

In a peat bog near Mullerup, on the island of Zealand (Denmark), George F. L. Sarauw explored (1900) a station which contained elements resembling in part the Azilian-Tardenoisian and which evidently belonged to the very close of this transition epoch. It is known as *Maglemose* (great swamp) and was a sort of moor dwelling. Neither pottery nor the remains of the reindeer were found at Maglemose. The abundance of harpoons and the absence of pottery recall the Azilian (Fig. 259); there is this difference, however: the harpoons are rarely of staghorn, but of bone with a single row of lateral barbs. The microlithic industry is that of the Tardenoisian, while the paring knives and a species of flint pick foreshadow the coming of the Campignian Epoch. A characteristic implement (a species of harpoon) demonstrates at least one of the uses to which microliths were put; it is a pointed bone shaft with a longitudinal groove on either side into which were fitted tiny geometric flints (Fig. 260).

The character of the fauna and flora of Maglemose proves that it must have antedated even the oldest Danish kitchen middens. The elk, stag, roebuck, wild boar, and *Bos primigenius* were dominant. The moose was practically extinct at the beginning of the kitchen-midden epoch. There were no domestic animals, with the possible exception of the dog. The pine, dominant at Maglemose, gave place to the oak in the kitchen-midden epoch. The Maglemosean industry may, therefore, be correlated with the land uplift that converted the Baltic into a fresh-water lake (Ancylus stage).

A second station in the same peat bog, near the one explored

by Sarauw, was discovered in 1903 and studied by Neergaard for the Danish National Museum.

The extraction of peat from the bog of Svaerdborg, begun in 1917, led to the discovery of a third very important station belonging to the Maglemosean Epoch. This site was explored during the summers of 1917 and 1918 by K. F. Johansen with the collabora-

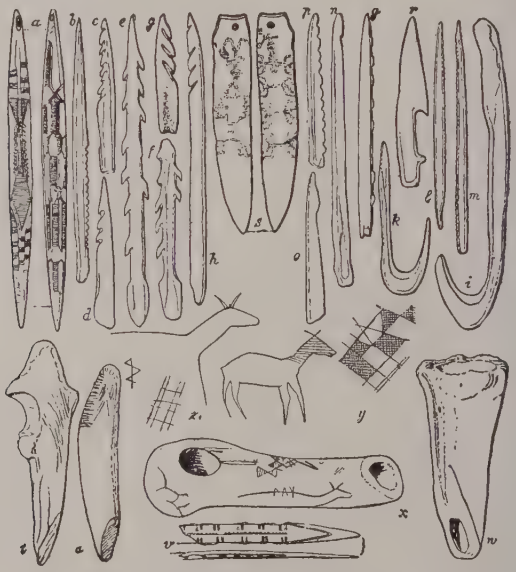

FIG. 259. CULTURAL REMAINS OF THE MAGLEMOSEAN EPOCH.

*a*, *s*, bone polishers; *b-h*, *l-p*, *r*, harpoons; *q*, *v*, bone shafts grooved longitudinally and fitted with microliths (see Fig. 260); *i*, *k*, fishhooks; *t*, bone dagger; *u*, chisel; *w*, bone ax; *x*, *x'*, *y*, staghorn ax and engraved figures. Scale, $\frac{1}{5}$. After Obermaier.

tion of K. Jessen and H. Winge. Winge gives a list of more than thirty species of vertebrate remains found at Svaerdborg, the list being the same as for the two Maglemosean stations of Mullerup but quite different from the list of vertebrate remains from Danish kitchen middens. It is preëminently a lake and forest fauna. Fragments of one human skull were found.

Among artifacts, stone implements play a more important rôle than at Mullerup. All are of flint, which is abundant locally. That

the site was a workshop and the implements fashioned on the spot is attested by the great quantity of chips and rejects—more than a hundred thousand in all. Flint blades were much more abundant than at Mullerup. The small triangular points play the same rôle at Svaerdborg as the arrowheads with transverse edges do in the kitchen middens. This old triangular type persisted, however, and is sometimes found in association with the transverse-edge arrowheads, as at Godsted and Bodal.

Svaerdborg was rich in tools made of deerhorn and of bone (776 examples). There were fifty-two examples of the ax made of deerhorn with a hole for the insertion of a handle. They belong to two types: in one, the deerhorn is cut on a bias to form the edge; in the other, the deerhorn serves as a socket into which the cutting tool or weapon proper (either flint or deerhorn) is fitted. Complete specimens, except for the handle, were found. All the examples from both Mullerup and Svaerdborg are mounted as adzes rather than as axes proper; on the other hand, axes and adzes are found side by side in the kitchen middens. Horns of the roebuck were converted into pointed implements.

Svaerdborg and Mullerup yielded large quantities of bone points made either of tubular bones or of ribs. The points made of ribs are not so numerous as those made of tubular bones. They are larger than those belonging to the later kitchen-midden epoch. Bone points with barbs are especially characteristic of the Maglemose Epoch; all the barbed bone points thus far discovered in Denmark antedate the epoch of the kitchen middens. Johansen found 213 examples at Svaerdborg, all of the same type, which was also dominant at Mullerup and which is distinguishable by the presence of one or only a few small barbs just back of the point. The point with large hooked barbs and the point with many fine barbs are both lacking at Svaerdborg.

These barbed points were presumably fixed to a shaft or handle, though none of these has been preserved. The points sometimes occur in bundles as if they had been fixed to a common shaft, but the rule was probably a single point to a shaft, forming a sort of javelin useful both in the chase and in fishing. The discovery of a barbed bone point in immediate association with the skeleton of a pike was reported from a peat bog in Scania in 1907.

In addition to the bone points described above, three bone points each with a bilateral armature of small flints, were found at Svaerdborg. Similar examples have been reported from various parts of the island of Zealand and from Scania, but none were found at Mullerup. The only bone point with flint armature from Mullerup was of a special type, large and flat. A fine example of the type from Svaerdborg was acquired by the Peabody Museum of Yale University in 1873. The following legend was written on one side of it: "Bog-find from Jutland in 1867, by farmer Christen Hansen" (Fig. 260).

FIG. 260. MAGLEMOSEAN POINTED BONE SHAFT FITTED WITH MICROLITHS.

This harpoon was found in 1867, in a bog in Jutland, Denmark, Scale, ⅔. Yale University Collection.

Knife handles, both of bone and of deerhorn were found at Svaerdborg. The handle made from the metatarsal or the metacarpal of the wild boar seems to be a novelty; eighteen examples were found. The bone was cut off squarely a short distance below the proximal articulation, and the distal end was chosen for use because of its adaptability to the hand and its natural cavity into which a tool could easily be set.

Johansen mentions the finding of three bone fishhooks at Svaerdborg. The one in most perfect condition was cut from the walls of a tubular bone; it has a completely recurved point and, so far as shape and workmanship are concerned, could be duplicated by bone fishhooks found by Mills and others in the prehistoric Indian mounds of Ohio.

Canines of the wild boar and incisors of the beaver were employed as cutting tools. Perforated teeth of *Ursus, Bos,* and the otter were employed as pendants.

Holmegaard, also on the island of Zealand, is a station dating from the Maglemosean Epoch. During this epoch settlements were generally on low ground on the shores of comparatively large lakes

or on small islands in the lakes. This mode of habitation seems to have continued uninterruptedly into the epoch of the kitchen middens, as attested by the stations in the peat bog of Godsted.

The remarkable station of Braband (Jutland), which bridges the gap between the Maglemosean culture of Mullerup and Svaerdborg and the epoch of the kitchen middens, was discovered in 1900 and explored in 1903 and 1904. The site is at the eastern extremity of the lake of Braband and about 4.7 kilometers (3 miles) southeast of Aarhus; it was probably an island at the time it was inhabited. The portion explored covers an area of 94 square meters

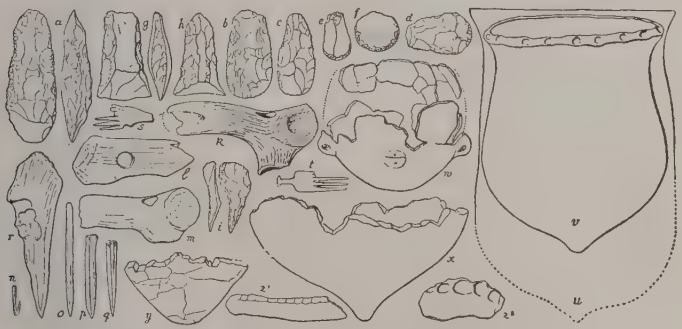

FIG. 261. CULTURAL REMAINS OF THE DANISH KITCHEN MIDDENS. EARLY NEOLITHIC PERIOD.

The implements illustrated are as follows: *a*, flint pick; *b*, *c*, flint axes; *d*, *e*, *f*, flint scrapers; *g*, *h*, flint cleavers; *i*, flint awl; *k*, *l*, *m*, implements of staghorn; *n*, fish hook; *o*, *p*, *q*, bone needles; *r*, bone dagger; *s*, *t*, bone combs; *u*, *v*, *w*, *x*, *y*, *z*, pottery. Scale, *ca.* $\frac{1}{3}$. After Obermaier.

(112.6 square yards). It yielded a large quantity of cultural remains including flints (30,000 rejects), objects of staghorn, articles made of bone (including combs), wooden implements, and crude pottery vessels with pointed base (Fig. 261). The wooden implements testify to the presence, during the epoch in question, of the hazel (abundant), oak, ash, and maple.

The faunal remains from Braband, in order of their abundance, are: *Cervus claphus* (far in the lead), wild boar, *Bos taurus urus*, *Cervus capreolus*, *Martes sylvatica*, dog, seal, elk (*Alces machlis*), several species of bird, one of fish (*Pleuronectes*), and several species of shell fish (*Ostrea edulis*, *Cardium edule*, *Mytilus edulis*, *Littorina littorea*, *Scrobicularia piperata*, etc.)

### Geographic Distribution of Azilian, Tardenoisian, and Maglemosean Cultures

Azilian-Tardenoisian culture has been found in all three continents of the Old World. Although its geographic distribution in detail does not coincide with any one of the Paleolithic cultures, it more nearly follows Magdalenian lines than any other. The

Fig. 262. Map showing the geographic distribution in Europe of the Azilian, Tardenoisian, and Maglemosean cultures.

Azilian and Tardenoisian races did not suffer from the glacial handicap and, therefore, spread northward into Scotland and Denmark (where their culture is known as Maglemosean), thus achieving a greater latitudinal extension than any of their predecessors. They roamed at will over Africa and left traces in Asia[6] as far east as India. Switzerland was inhabited; but with exception of the Crimea, no stations have been reported from southeastern Europe (Fig. 262). The European localities may be tabulated as follows, the type of culture being represented by the initial letter in parenthesis.

[6] Mesopotamia, the foothills of the Vindhya Mountains (pygmy flints) in Central India, and Banda (pygmy flints) and Mirzapur in Madras Presidency.

EUROPEAN DISTRIBUTION OF TRANSITIONAL CULTURES

## EUROPE

### Belgium

*Brabant.*—Zonhoven (*A* and *T*).
*Chaleux.*—Cave of Baleux (*A*).
*Liège.*—Remouchamps (*A-T*).
*Namur.*—Le Chêne (*A*); Le Sureau (*A*).

### Denmark

*Island of Zealand.*—Holmegaard (*M*); Mullerup (two stations) (*M*); Svaerdborg (*M*).

### England

*Kent.*—Kitchen middens at Seven Oaks (*T*).
*Lancashire.*—Peat bogs in the eastern part (*A-T*).
*Somerset.*—Aveline's Hole (*A*).
*Yorkshire.*—Peat bog at Hornsea (*T*); Victoria cave (*A*).

### France

*Ain.*—Sous-Sac (*A*).
*Aisne.*—Fère-en-Tardenois (*T*).
*Ariège.*—Mas d'Azil (*A*); Massat (*A*); Montfort (*A*); La Vache (*A*).
*Aude.*—La Crouzade (*A*).
*Côte d'Or.*—Le Poron des Cueches (*T*).
*Dordogne.*—Laugerie-Basse (La Grange and Marseilles) (*A*); Longueroche (*A*); La Madeleine (according to de Mortillet) (*A*); La Mouthe (*A*).
*Drôme.*—Bobache and six other stations reported by H. Müller (*A*).
*Finistère.*—Kitchen middens of La Torche (*T*).
*Gard.*—Labric (*A*).
*Gironde.*—Littoral of the Medoc (*A*) (according to Lalanne).
*Haute-Garonne.*—Gourdan (*A*); Lespugue (Grotte des Harpons) (*A*); La Tourrasse (*A*).
*Hautes-Pyrénées.*—Lorthet (*A*); Lourdes (*A*).
*Haute-Savoie.*—Sur-Balme at Veyrier (explored by Reber) (*A*).
*Landes.*—Sordes (*A*).

*Loiret.*—Le Muids (according to Breuil) (*A*).

*Lot.*—Les Cambous (*A*); Le Pouzats at Reilhac (*A*); Roussignol (*A*).

*Savoie.*—Grande-Gave (*A*).

*Seine-et-Marne.*—Beauregard (*T*).

*Valley of the Somme.*—Bois de Champien (*T*); Bois du Brûle near Ercheu (*A*); Bois du Glandon (*A*); Haute-Barne in Beaulieu (*T*).

### Germany

*Baden.*—Cave of Istein (*A*) and Kleinkems (*A*), both reported by Mieg.

*Bavaria.*—Grosse Ofnet (*A-T*); Hohlerfels near Neuremberg (*A*); Kauffertsberg near Ludheim (*A-T*); vicinity of Neustadt (reported by Mehlis) (*A*).

*Saxe-Meiningen.*—Cave of Wüste Scheuer near Döbritz (according to R. R. Schmidt) (*A-T*).

*Westphalia.*—Balver and Martin's cave near Letmathe (according to R. R. Schmidt) (*A-T*).

### Poland

Tardenoisian said to be abundant.

### Portugal

*Valley of the Mugem.*—Cabeco da Arruda and several other kitchen middens (*T*).

### Russia

*Crimea.*—Kaba cave (*A*).

### Scotland

*Argyllshire.*—Rock shelter of Druimvargie (*A*); Oban caves: Distillery, Gas Works, MacArthur, MacKay (*A*); Island of Oronsay, shell mound known as Caisteal-nan-Gillean (*A*).

### Spain

*Albacete.*—Alpera (*T*).

*Asturias.*—La Paloma (*A*); La Riera (*A*); Sofoxo (*A*).

*Guadalajara.*—Environs of Aguilar de Anguita and Alcolea del Pinar (*T*).

*Oviedo.*—Quintanal (*A*).

*Santander.*—Castillo (*A*); La Hermida, open-air station, valley of the Deva (*A*); El Pendo (*A*); Rascaño (*A*); Valle (*A*); Villanueva (*A*).

*Viscaya.*—Balzola (*A*).

### Switzerland

*Basle.*—Environs of Basle (according to Sarasin) (*A*); Bellerive near Delémont (*A*); Birseck (*A*).

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# CHAPTER XI

## THE NEOLITHIC PERIOD

The Neolithic Period was at first and is still often referred to, especially by the French, as the age of polished stone implements. From this expression, however, it should not be inferred that during the period in question all stone implements were fashioned by polishing. Certain kinds of stone intended for special purposes were polished in Paleolithic times, but the polishing was not a part of the shaping process (Vol. I, p. 156). On the other hand, even during the first part of the Neolithic Period, polishing as a shaping process in the stone industry was comparatively rare, while the use of chipped stone implements persisted throughout the period. Certain types of stone tools, such as simple blades, scrapers, spokeshaves, points, microliths, etc., which appeared first in the Paleolithic Period, were carried over into the new era, often without marked change of form. The same may be said of the flat harpoon of staghorn which characterized the Azilian Epoch. On the basis of lithic industry alone, therefore, and in the absence of certain forms, it is sometimes difficult to differentiate between an early Neolithic and a late Paleolithic site. In other, and important, respects the two periods are as different as two successive ages could well be.

Many factors contributed to the change. New conditions arose and were met in new ways. The gradual change of climate from cold and dry to warm and humid was linked with a change of fauna and flora. Among the faunal remains there are no fossil species in the strict sense since the Neolithic Period belongs to the geologic recent. The relative security of Paleolithic cave life led by degrees to the increase of the population; this in turn gave rise to a division of labor out of which new needs arose. The twofold increase in numbers and in needs was a greater draft than any mere hunter stage of civilization could stand. Hence the disap-

pearance of troglodyte art and of the belief in its talismanic efficacy was followed closely by the domestication of animals and plants.

Thus to Neolithic man belongs the credit of inaugurating on an appreciable scale the conservation of natural resources, to which, more than to anything else, all subsequent progress has been, and will continue to be due. While by no means giving up his quest for food in the sea, forest, or stream, man was no longer in a position of dependence upon such sources. Whether or not the art of domestication came with invading hosts from the east is not so important as the fact that it came.

The control of the food supply made village life possible, and this, in turn, led to societal organization, without the discipline of which such important works as fortifications, megalithic monuments, lake villages, etc., could never have been consummated. Caves and rock shelters were not wholly abandoned as places of habitation, but they were more and more diverted to special uses, such, for example, as communal sepultures.

It is now established that the cult of the dead, the funeral rite, antedates Neolithic times, but the number of authentic Paleolithic burials is not large. The Neolithic peoples disposed of their dead in a variety of ways. In the first place, there was the simple burial in the earth, without protecting envelope of an enduring nature. Natural caves were converted into burial chambers; artificial caves were employed in the same way, as were also the dolmens and the much less pretentious stone cists. Inhumation remained the dominant mode, but incineration was also practiced to some extent in France, Germany, and Switzerland.

With the growth of communal life the need of receptacles for containing and storing both liquids and solids would make itself increasingly felt. To meet this need there were called forth the ceramic and the textile arts, both of which have counted for much in human comfort and in the cultivation of the esthetic sense in all subsequent ages. Through these new channels it was possible once more to give expression to the innate feeling for art which in previous ages had been so well and realistically expressed under different conditions.

The healing art might have had its beginnings at an earlier age; at all events considerable progress was recorded during the

Neolithic Period, especially in surgery. In boldness, skill in execution, and successful outcome, some of the Neolithic trepanations would be a credit even to a modern practitioner.

It is not definitely known just when the art of navigation had its birth; we do know, however, that Neolithic achievement in this direction was by no means unimportant.

## Neolithic Chronology

### *Scandinavia*

Various attempts have been made to establish a relative chronology for Neolithic times. Some seem to hold good for the countries in which they were developed, but when an attempt is made to adapt them to other regions, serious difficulties arise. The Scandinavian system is perhaps the best known. With respect to it Montelius of Stockholm and Müller of Copenhagen are in practical accord. In its main features the system is as follows:

1. *Epoch of the kitchen middens.* The industry includes chipped stone implements, pottery made of an extremely crude paste which contained much pulverized granite, and articles of bone and staghorn. Perforated teeth were used as ornaments.

2. *Epoch of the pointed and the flat-polled ax or hatchet.* This second epoch is characterized by two types of the polished stone ax, one with a pointed poll and the two convex sides meeting everywhere along the periphery, the other with a thin, flat poll and the two broad sides meeting only at the cutting edge. These two chief hatchet forms, with their variations, were not the only artifacts belonging to the middle stone epoch; spear points, arrowheads, and knives of flint abound. One of the chief ornaments was amber.

3. *Epoch of the stone graves.* This epoch is noted for beautifully chipped implements of flint, the most characteristic being the thick-poled ax or hatchet. Axes of stone other than flint, with perforation for hafting, are plentiful. Chisels, saws, punches, knives, hammers, skull crushers, spearheads, poniards, etc., abound. Well preserved specimens of pottery show a marked improvement in the ceramic art. This epoch admits of a subdivision into four phases characterized by: (*a*) simple dolmens, (*b*) many-chambered dolmens, (*c*) stone cists, and (*d*) individual graves.

*Epoch of the Kitchen Middens.*—Scandinavia is of more than usual interest to the prehistorian. Rich in remains of the Neolithic Period and of the Bronze and Iron Ages, the region has been studied with a thoroughness that has led to far-reaching results. It will be recalled that Thomsen, the founder of prehistoric archeology, was a Dane. Thomsen was fortunate in his contemporaries and immediate successors. He found a ready and powerful advocate in Nilsson, professor of zoölogy in the University of Lund, Sweden, who likened the northern stone artifacts to the tools and weapons of living savage races. Thomsen's assistant, and afterwards his successor as director of the Copenhagen Museum, Worsaae was the first to announce the real significance of the so-called *kjökken-möddinger* or kitchen middens. These had hitherto been looked upon as natural beach formations, dating from a time when the sea level in northern Denmark was many feet higher than at present.

Being formed (as was supposed) by the waves, these kitchen middens were studied by Forchhammer, the geologist; containing remains of a recent fauna, they attracted the attention of Steenstrup, the zoölogist; and containing stone implements, they came within the province of the young archeologist, Worsaae. In 1850, after an official tour of some of the kitchen middens where he had excellent opportunities to observe fresh sections, Worsaae recorded in his notebook these words: "One might almost think these heaps were the places where the people of the neighborhood, in that far-off time, took their meals, as witness, for example, the potsherds, charcoal, bones of animals, and stone implements." He added, with caution: "This is, of course, mere conjecture, and should be treated as such." Before the close of that year, however, further investigation established the truth of Worsaae's conjecture. At the beginning of the year 1851 this important discovery was formally announced before the Academy of Sciences by Steenstrup, and before the Archeological Society by Worsaae himslf.

The principal constituents of the kitchen middens are shells of the oyster (*Ostrea edulis*) and the cockle (*Cardium edule*). *Mytilus edulis, Littorina littorea,* and *Nassa reticulata* are also abundant. The bones of the sole, torsk, herring, eel, duck, goose, swan, sea gull, etc., are not uncommon. Mammals are represented

by the stag, roebuck, *Sus*, *Bos primigenius*, bear, wolf, beaver, wildcat, etc. Steenstrup's investigations prove that the oldest industry was contemporaneous with the fir tree and the pine in Denmark. The oak had just made its appearance. The pine must have been abundant, for the bones of the black cock are numerous, and it fed principally on the pine. No reindeer bones, nor bones of any domestic animal except the dog, have been found in Danish kitchen middens. Stones forming hearths and bearing marks of fire occur at various levels in these deposits. Oysters were roasted in the fire, and bones were heated to render the marrow more easily removable. No marrowbone was wasted; all were broken in a uniform manner and by a single stroke. Implements of stone, bone, and staghorn are often very abundant. The number of artifacts in the great kitchen midden at Meilgaard has been estimated at 103,400, or nearly two for every cubic foot of the mass.

On account of the change of land level in northern Denmark and the consequent drying up of bays and arms of the sea, many kitchen middens are now some distance from the coast. A reverse movement has taken place along the southern shores of Denmark, where the sea has encroached on the land so that the kitchen middens are usually at the water's edge, and even hidden beneath shallow waters to be laid bare only at low tide. Destructible materials, such as bone, shell, and pottery, are of course wanting, but hearthstones and flint implements are strewn along the beaches. Further proof of a subsidence is furnished in the unearthing of undisturbed stations in protected spots, at a depth of several feet below the present water level.

Stations of the same age as the kitchen middens are found inland on the shores of fresh-water lakes, or on their islands, where they have been preserved by a rise of the water level. These old habitations of the earliest occupants of the country were first covered by water; later the lakes were converted into peat bogs. By the present-day harvesting of peat these stations come to light. Again, during an unusually dry season stations are uncovered in lake beds that are not yet wholly dried up.

Following the discoveries made in Denmark, kitchen middens have been found in many parts of the world, especially on the

coasts of France, Portugal, Japan, and America. The Danish kitchen middens are not the oldest of the period, but nowhere do kitchen middens antedate the post-Pleistocene.

The various forms of stone implements belonging to the kitchen-midden period depend essentially on the nature of flint and the method of working it. If a nodule of flint receives a diagonal blow against the surface near an edge or margin, a flake is removed, leaving a single surface of fracture. The careful removal of a few such chips leaves a core, or nucleus, with a more or less uniform series of surfaces. From such a block the workman can remove either discoidal or laminate flakes, depending on the regularity and form of the nuclear facets.

The places of habitation abound in flint chips of every conceivable shape which show traces of having seen service. Many bear only slight marks of special adaptation to the uses they served; sometimes an edge or point that could have cut the fingers is removed, or a desired edge or point is produced without materially altering the original chip. These makeshifts for tools, while abundant, are less important than the implements formed on regular patterns and destined for specific purposes.

The first and foremost need was for a cutting tool. This was to be had in the bladelike flint flake, either just as it came from the parent core, or retouched at the end, or at the end and along one edge. But, being bow-shaped, the flint flake could not well be used for cutting in the direction of its long axis. These limitations, combined with brittleness, made it necessary constantly to replace dulled and broken flakes by new ones. They are consequently the most numerous of all implements of this epoch.

Large discoidal flakes were used in the manufacture of a characteristic wedge-shaped implement which, for the want of a better name, we shall call a paring knife. The edge, being formed by two surfaces that diverge at an angle of 30° or 40°, is capable of much hard service. Striae at right angles to the edge are often observable under the magnifying glass. These paring knives were hafted and used as hatchets.

The workmen of the time were ingenious. They not only utilized the irregular discoidal flakes in the manufacture of the useful hatchet, but also knew how to convert a long, delicate, lami-

nate flint flake into a number of diminutive, hatchet-shaped arrow points. One of these, still attached to its shaft, was found in a peat bog. They may have been used for other purposes also.

The hatchets and adzes of this early period were represented by chipped flints, the lateral margins of the two surfaces meeting everywhere at the periphery. The lateral margins of the hatchet were in the same plane as the longest diameter, while those of the adze were always slightly inclined to the plane of the longest diameter.

Judging from the abundance of the fragments, pottery must have been in common use, though no complete vessel has yet been found dating from the kitchen-midden epoch. The principal forms were jars, with flat or pointed bottoms, and bowls, all made of an extremely crude paste containing much pulverized granite. The upper border was sometimes decorated with a series of gashes or imprints.

Northern and eastern Scandinavia were not settled so early as Denmark. The first settlements (kitchen-midden) must have begun some six or seven thousand years ago, and the epoch may have lasted two thousand years. During this epoch, stone implements were not polished. Even during the two succeeding epochs, polishing was confined chiefly to edged tools, all others being chipped only.

*Epoch of the Pointed and Flat-Polled Ax or Hatchet.*—The polished ax, with pointed poll and the two convex surfaces meeting along the lateral margins and the edge, belongs exclusively to the second epoch. It is derived from the unpolished ax of the earlier period, and has an almost unlimited habitat, not being confined to Scandinavia, or even to Europe. All subsequent types are more and more limited geographically, until the most recent are confined to Scandinavia.

The other characteristic type of this epoch, the ax with thin, flat head, or poll, is derived from the ax with pointed poll and is the most widely disseminated of all purely northern forms. It is sometimes found in the stone graves and therefore marks the close of the second phase (Fig. 263).

In addition to these two types of the ax or hatchet, there are spearheads and arrow points without notches or barbs at the base,

and poniards, like the spearheads, with a broad squarely cut or rounded shaft end.

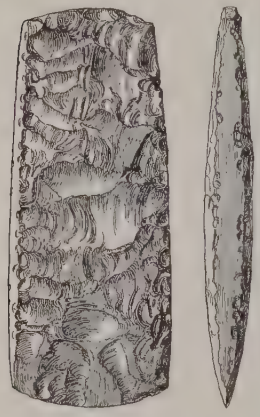

FIG. 263. FLINT AX WITH FLAT POLL FROM MOGENSTRUP, DENMARK.

Axes of this type characterize the second epoch of the Neolithic Period in Scandinavia. Scale, ½. After Nordman.

Amber is often found in clay or wooden vessels. It is one of the chief ornaments of the period. The pieces were sometimes used in the rough, with a simple hole pierced for the passage of the string. A necklace consisted of one or many strings of amber beads.

*Epoch of the Stone Graves.*—Scandinavia's most imposing prehistoric remains are, without question, the stone burial chambers which, as has already been said, characterize the third or closing epoch of the Neolithic Period. Their peculiar forms, the size of the stones used, the picturesqueness they lend to the landscape, all combine to invest them with a perennial and universal interest. Until recently they were looked upon as altar and temple sites. We now know them to be funerary chambers.

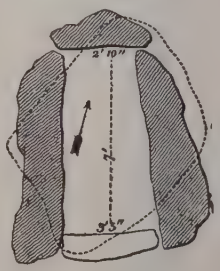


FIG. 264. GROUND PLAN OF A SMALL DOLMEN AT VOLLERUP, MOEN ISLAND, DENMARK.

This is the simplest type of dolmen or funerary chamber; it characterizes an early phase of the third epoch of the Neolithic Period in Scandinavia. The structure consists of four stones for the walls and one for the roof. After Müller.

The simplest *dolmen*[1] is that formed of four stones for the four walls and one for the covering or roof (Fig. 264). While a chamber could be formed of three upright stones, it would hardly be worth while, as so much space would be lost in the corners. The three-cornered chamber, in fact, does not exist. The four-sided rectangular chamber, on the contrary, is the most numerous and widely distributed of all northern constructions. It is generally 1.52 to 2.13 meters (5 to 7 feet) long, and from 0.61 to 1.07 meters (2 to 3.5 feet) wide. The height varies from

[1] A Breton word applied to burial chambers of stone (see Vol. II, p. 111).

0.92 to 1.52 meters (3 to 5 feet). One of the end stones serves as a door, and it is a little shorter than the other three. The door may consist of two stones, but this does not alter the shape of the chamber.

The five-sided dolmen is rare. The six-sided dolmen is very common. If there is a longest diameter to the hexagonal chamber, it is the one in the direction of the entrance. The small dolmens were always covered by tumuli of earth and stones which served to strengthen the structure and protect it in every way.

Dolmens set in excavations are the exception. In all the four-, five-, and six-cornered dolmens, the roofing stone is visible above the tumulus of earth. This horizontal stone was always thick, with convex upper surface, much heavier than would be necessary as a simple covering of the chamber or even as a support for an overlying tumulus. They were evidently intended to be visible from the very first.

FIG. 265. A TUMULUS NEAR ÖLSTYKKE, DENMARK, COVERING TWO DOLMENS, AND A NEARER VIEW OF ONE OF THE DOLMENS.

Photographs by the author.

To protect the entrance from the encroaching earth, two stones were sometimes set up at the sides of the door. A horizontal stone was often placed over the two upright stones, thus forming a

sort of vestibule nearest the entrance where the heap of earth would be highest and most likely to obstruct passage. A long vestibule (*allée couverte*) leading to the door formed a still better protection. Such chambers were covered, either by a round or by a long tumulus.

The round tumulus is rather flat, covering only the sides of the chamber, and generally 9.1 to 12.2 meters (30 to 40 feet) in diameter, rarely 18.3 meters (60 feet). It is usually surrounded by a circle of large stones, placed a meter or so (a few feet) apart, simply indicating the limits of the monument. The long tumulus is also low, seldom more than 1.5 or 2 meters (5 to 6 feet) high, from 6 to 9 meters (20 to 30 feet) wide, and 15 to 30 meters (50 to 100 feet) long, and is surrounded by a rectangular enclosure of stones set a meter or more apart.

The dolmens in these two forms of tumuli are the same. The long tumuli are common burial places. One tumulus was made to cover several dolmens, and if more dolmens were needed, the area of the tumulus was increased correspondingly (Fig. 265). The oldest graves of the Stone Age are the small dolmens found in the round and long tumuli (in Great Britain called *round barrows* and *long barrows*).

The small dolmens of the early type may be traced over practically the whole of Europe, as well as parts of Africa and Asia. The stone at the entrance is often perforated with a round or square hole, or there may be two doorstones, each contributing half the opening. Such openings are common to dolmens in France (Fig. 266), England, Crimea, Caucasus, Palestine, India, and Sweden, but are not found in Denmark.

The large, many-chambered dolmens are confined to western and northern Europe and belong to a later epoch. These are usually called *giant chambers* or *megalithic monuments*. They include all dolmens of more than six sides, more than one roofing stone, and one or many chambers. The nature of the material had then, as now, much influence on the form and disposition of the structure. The width of the chambers could not be greater than the greatest length of the stones at hand, as it was necessary for the cover stones to reach from one side to the other. The side stones were so placed as to incline gently inward and naturally

supported each other. The roofing stones held them still more firmly together. The chinks between sides and roof were usually stopped with small stones.

One weak point in the building was the foundation. Excavations were rarely made, the dolmens being built, as a rule, on the natural surface of the ground. Space was economized by turning the flatter surface of the side stones inward. Once in a while a great boulder was split in order to obtain a flat surface where

FIG. 266. DOLMEN OF TRIE-CHÂTEAU, OISE, FRANCE.
The small stone forming the door to the chamber is pierced with a round hole.

none existed before; beyond that, there was no splitting or hewing of the stones. Mortar was not known, but the artisans of the time understood the impervious character of loam, which was used in covering the whole structure, particularly in stopping leaks between the roof and sides. The floors were of loam as well as of rubble and flagstones. The interior of the giant chambers was never less than 1.2 nor more than 2.2 meters (4 to 7 feet) in height. The length of the vestibule depended on the size of the tumulus, its purpose being to insure passage to the chamber. Vestibules 4.6

meters (15 feet) long were not uncommon, and some were even longer.

Although the roofing stones of some giant dolmens are visible, the tumuli are, on the whole, much more pronounced than are those of the earlier small dolmens. The tumulus is generally round (Fig. 267); in rare instances it is long, and surrounded by a rectangular enclosure of large stones. Where the chamber is com-

FIG. 267. TUMULUS COVERING A GIANT DOLMEN AT ÖLSTYKKE, ZEALAND, DENMARK.

The entrance is hidden by bushes. In dolmens of this type, which were common burial places, many skeletons are found in disorderly heaps, sometimes covering the floor to a depth of four feet. Photograph by the author.

pletely covered with earth, the tumulus is always round, the height being from 3 to 4.6 meters (10 to 15 feet) and the diameter as much as 27.5 meters (90 feet).

The giant dolmens were numerous and widely disseminated. Many have been demolished, the stones being carried off for construction of fences and houses; others are still hidden underneath more or less prominent tumuli. Some of the dolmens are double, with separate vestibules, built, it may be, at one time, or possibly a portion at a time. Again, the need of enlargement was met by

additional chambers reached through one of the existing chambers.

The giant dolmens of Denmark are strikingly uniform, the greatest diameter of the chamber being always at right angles to the entrance. This may be called the northern type in contradistinction to the type of other lands (Fig. 268). In Great Britain a single long entrance leads to a series of chambers connected by short passageways. Such a giant dolmen was naturally covered

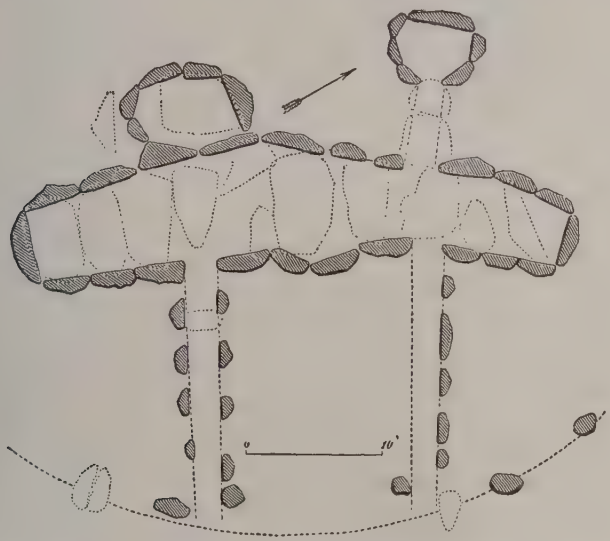


FIG. 268. GROUND PLAN OF A GIANT DOLMEN OF THE NORTHERN TYPE AT GUNDESTRUPGAARD, JUTLAND, DENMARK.

Dolmens of this type invariably have the length of the principal chamber at right angles to the entrance. The small chambers were set apart for the use of a single sex or a single family. After Müller.

by a long, oval tumulus, called in England the *long barrow*. The roof is also sometimes constructed differently. Instead of the flat roof, there may be an arched one, composed of horizontal, overlapping stones, a construction evidently of later date than the flat roof. The arched roof is also common to Ireland, the most remarkable chamber of this sort being at New Grange, near Drogheda. A long entrance way pierces the round tumulus at New Grange, leading to a great chamber in the form of a cross over

whose center rises an arch to the height of 3.4 meters (11 feet). The tumulus is about 91.5 meters (300 feet) in diameter, and the entrance is 18.3 meters (60 feet) long.

In the giant dolmens the human remains are heaped on the floor of the chambers to a depth of from a few centimeters to more than a meter (few inches to several feet). They sometimes cover the entire floor and even encroach on the entrance way for a considerable distance; again they are found in isolated heaps only. The bones usually lie in such disorder as to render it impossible to bring together those of any particular skeleton. Through the mass of human bones are strewn in purposeless fashion fragments of man's handiwork. The necessity of making successive burials in a limited space was the probable cause of the disorderly arrangement of bones and artifacts, the earlier remains being shoved aside to make room for later burials. The earlier deposited funerary objects suffered the same fate. The few undisturbed skeletons are, without exception, in positions where the necessity of disturbing them would be least likely to arise. A chamber may contain from twenty or thirty to one hundred skeletons, including those of both sexes, adults and children; it served all the inhabitants of a limited area. Some chambers were set apart for one sex only, or for a single family. Each dolmen probably continued in use for a considerable period of time.

The deposit of bones, etc., was covered by a layer of stones or crushed flint. This protective layer, sometimes 61 centimeters (2 feet) thick, rarely consists of a mixture of earth and stones. Not infrequently a deposit of loam is found, either immediately on the mass of bones or covering the protective layer of stones or crushed flint. Where there are isolated heaps of bones in the same chamber, one may be covered with flat stones and another with crushed flint. The protective layer never completely filled the chamber. Stones and earth might filter through and fill the space thus left, but such infiltrations need never be mistaken for the protective layer. The space thus filled in above the protective covering was frequently utilized during the succeeding Bronze Age as a resting place for mortuary urns.

Objects found in a giant chamber are not strictly contemporaneous, as are those from the grave of a single person, but

they are the best chronometers we have of that period of the Stone Age to which they belong. A large dolmen will contain, on an average, twenty or thirty stone hatchets and chisels and as many arrowheads. The flint chips are more numerous. Pottery, both whole and in fragments, is abundant, and it is of special interest on account of the style of ornamentation. Objects of bone and horn are also found. The funerary objects are both new and old; some are even unfinished, others restored, resharpened, etc. The dead probably received his own belongings, whether they had ever seen use or not. The practice of "killing" (breaking) all funerary objects was evidently not in vogue among the Northmen of this period.

The monumental burial chambers already described in detail are the best index of the occupation of the country toward the close of the Neolithic Period. Many of these monuments have been destroyed, in prehistoric as well as historic times, yet the number still existing is very great. Petersen's estimate for the Island of Zealand alone is placed at 3,400, or about twenty-seven to the square mile. They are most abundant where erratic blocks of the desired size are most plentiful. In choosing dolmen sites preference was also given to productive areas. They generally lie in, or adjacent to, arable and pasture lands. About four thousand ancient monuments have been set aside as belonging to the Government of Denmark; Norway and Sweden have similar laws in force.

With increasing knowledge of agriculture and the domestication of animals, the people were no longer dependent on hunting and fishing, as they had been during the earlier kitchen-midden epoch. To the dog, the sole domestic animal of the earlier period, were added the cow, sheep, hog, goat, and horse. Various grains, chiefly wheat and barley, have recently been discovered accidentally encased in the paste of which some of the Neolithic pottery was made.

As the northern Stone Age is divided into three successive epochs, namely, that of the kitchen middens, of the pointed-polled and the flat-polled ax, and of stone graves, so the last of these three epochs may be subdivided into three successive phases, each characterized by a peculiar type of tomb. Two of these forms, the small dolmen and the large or many-chambered dolmen, have

already been described. There remains the latest group, consisting of two types, (1) stone cists and (2) individual graves. These, being built of small stones and covered by flat mounds of earth, long escaped notice; yet they form an important link in the series and mark the transition from Stone Age to Bronze Age burials.

Stone cists are made of comparatively thin, flat stones split for the purpose. The dimensions of a cist are modest in comparison with those of the megalithic monument, it being about 2.5 to 3 meters (8 to 10 feet) long, with a width and depth of less than a meter (2 feet wide, and 2 or 3 feet deep). Cists were built with less care than were the other dolmens, but the effects of faulty construction here would not be so disastrous as in the structures built of larger stones. The cist was first covered with a heap of stones, which was, in turn, buried beneath a mound of earth that seldom attained a height of 3 meters (10 feet) above the general level. A monumental circle of stones is never found around mounds enclosing cists. Access to a cist was gained by digging down through the mound and removing one or more of the roofing stones. There was usually a sort of false door at one end of the cist, a survival from the elaborate gangways to the dolmens, but it served no practical purpose. A cist contained from one to eleven skeletons. The disturbed condition of the bones where several skeletons are found in one cist indicates that the interments were not all made at the same time. Funerary objects are rare—a poniard, spearhead, battle-ax, a few arrow points, and, rarely, a piece of pottery.

Closely related to the stone cists, and belonging to the very close of the Stone Age, are the individual graves. These are even less conspicuous than the cists, and, as their name suggests, they never contain more than a single skeleton, which rests on a floor of loam or stone and is surrounded by a number of stones and simply covered by earth. Such burials are in, or under, low, flat mounds. The perforated celt or battle-ax is the usual accompaniment; to this may be added a spearhead or a poniard. A necklace of amber sometimes marks the grave of a female. Pottery is rare.

Reference has been made to the flat-polled ax, which is characteristic of the second period of the Stone Age. The most abundant

implement of the third or stone-grave epoch, is the thick-polled ax (Fig. 269). It is almost always of flint. The sides are narrow, and almost parallel, except near the edge. The pattern varies within certain limits. They were hafted as axes or hatchets when the sides were alike, and as adzes when one side was flatter than the other, or even concave. We find the same variations in the series of chisels and gouges.

FIG. 269. THICK-POLLED FLINT AXES FROM DENMARK.

This type of flint ax, which occurs in the dolmens, belongs to the third or stone-grave epoch of the Neolithic Period. When the sides were alike these implements were hafted as axes; when one side was flatter than the other, they were used as adzes. Scale, $\frac{1}{3}$. After Müller.

Sehested of Denmark demonstrated the efficiency of Stone Age tools by building himself a blockhouse[2] at Broholm, Fünen, using only flint implements. Within ten hours, and with one polished ax which did not require resharpening, twenty-six pine trees, averaging 20 centimeters (8 inches) in diameter, were felled and topped. The house complete (with door, window, and roof) was finished in sixty-six days. For the felling of trees the polished ax was much superior to one unpolished. Nevertheless, many forms of chipped implements remained in use, as, for instance, the flint flake, the saw made of a flake, the punch, scraper, etc. The saws that are chipped on both sides, with a well toothed edge and a uniformly convex back, belong to the close of the epoch. The convex back was fitted into a piece of wood, by means of which the saw was held when in use. These saws are seldom found in graves; otherwise they are quite common. Sehested employed them effectively in building the blockhouse.

The flint knife shows an evolution parallel to that of the saw. It began as a two-edged flint flake. Then one edge was chipped

[2] The blockhouse did not appear in central or northern Europe until the Hallstatt Epoch; Neolithic house construction was of the palisade type.

away to form a rounded back, leaving a single cutting edge. Sometimes there is chipping at the base to form shoulders for hafting.

While edged tools of flint were either set into, or bound fast to, a handle, edged tools of other kinds of stone were perforated for hafting. The heavy perforated axes were tools rather than weapons. Some have been resharpened so often that little is left except the pole and the perforation. This type is very common in Scandinavia.

Another group of axes served as weapons (Fig. 270). They are recognized by their elegant form and dull edge; they seldom bear evidence of having been sharpened. One style is common to Denmark and north Germany, while another is found in Sweden. The clubs and hammers vary as much in form as do the axes. The older grooved clubs were used both as war clubs and as hammers; the later and more elegant perforated specimens were weapons.

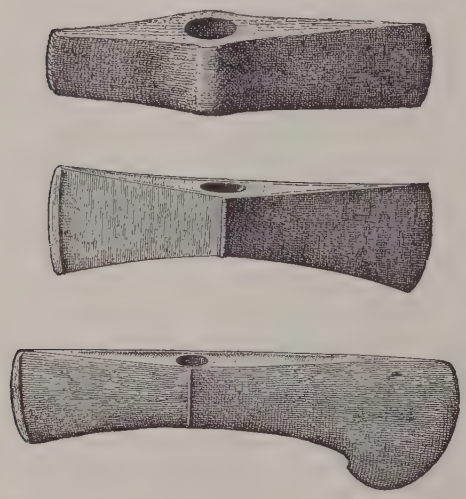

FIG. 270. STONE AXES WHICH WERE USED AS WEAPONS.

These graceful axes, which belong to the third epoch of the Neolithic Period, are found in the graves of warriors. The edges seldom bear evidences of sharpening. Scale, $\frac{1}{3}$. After Müller.

Spearheads and poniards (or daggers) are much more abundant than axes and war clubs. They are always of flint and belong to a limited number of well defined types. The hilt, or shaft end, varies so that one cannot always distinguish between the spear and the poniard. Those with beautifully chipped handles were, without doubt, poniards; even the most elegant were real weapons and not simply show pieces. They are often repeatedly retouched to a new edge, until the blade becomes small in proportion to the hilt.

Daggers are so numerous that it must have been the custom to carry one always in the belt. Arrow points (like the spearheads) were not resharpened; they are always of flint, and vary in form from the plain flint flake to the beautiful triangular notched specimens. Fish nets, fishhooks, and net sinkers have been found in peat bogs in such relationship to other objects as to render it possible to refer them to the closing epoch of the Stone Age.

Of clothing nothing has been preserved. Bone points that might have been used in punching holes in garments of skin are found in the dolmens. Amber continued to be the most highly prized ornament. Wooden utensils are rare, having fallen, for the most part, to decay.

Pottery of various forms abounds. There are composite vessels with the neck sharply defined from the body, vessels with covers and with handles, bowls, etc. Many pieces are richly ornamented. The hanging jar is one of the few forms that originated in the North. Between the few examples of pottery known to belong to the earlier epochs and the great variety to be found in the stone-grave epoch, there is a considerable gap.

The artifacts of the first half of the Neolithic Period bear the stamp of utility alone. No thought of pleasing the eye seems to have occurred to the workman. That such was not the case during the closing period is particularly evinced in the potter's art. Only the visible parts of a vessel were ornamented. The bottom was left plain; so was the interior unless the mouth was flaring. Pottery was handmade, being built up by means of spiral bands of clay and then smoothed on the surface. Firing generally produced a plain black exterior, was not uniform, often poor. The clay was at times mixed with pulverized granite.

The artist preferred a dotted line to a continuous free-hand stroke, and heightened the effect by filling in the dots with a white substance. Pure linear ornamentation is everywhere dominant during the latter part of the Neolithic Period. This age furnishes no representative of the complete human figure; but many seeming efforts to reproduce the human features are met with. The resemblance was not intentional, arising rather from a fortuitous combination of decorative elements in general use at the time. The human features occur only on vessels of a particular type, and

always on the same place—immediately beneath the upper margin, where on other vessels of the same shape the ear is found. The artist, seeing the resemblance of the arched prominences to eyebrows, added circles for the eyes.

Cup-shaped and other lapidarian sculptures have a widespread distribution in the Neolithic Period. They are seen on the outer as well as on the inner walls of both the small and the giant dolmens. Such markings are also found on stones which were never used as building material. They were probably connected with the religious beliefs of the time and belong in a group of symbols which still signify fruitfulness, good luck, etc.

Even the art of chipping flint reached the ornamental stage and is seen at its best in poniards. The art of polishing was of great practical moment, at least, for by it all edged tools were sharpened. There are three degrees of polishing: (1) a coarse finish extending over the entire surface and leaving whitish streaks, or lines, parallel to the length of the implement; (2) a finer polish limited to the blade; and (3) a mirrorlike surface at the very edge. Sehested produced the coarse polish with a flat piece of granite; he finished the blade with sandstone and gave the final touches to the edge with a whetstone of slate. It took him about a week, working six hours a day, to polish an ax 18 centimeters (7 inches) long.

Instead of discarding a dulled or broken implement, the thrifty artisans rechipped and repolished it to a fine edge. Tools were sharpened over and over again. They went even further and converted poniard handles into edged or pointed tools, and broken chisels into tiny hatchets. The village sites of this period have furnished little in the way of antiquities in comparison with the stone graves, and not much is known concerning the character of the dwellings.

The Scandinavian flint dagger or poniard is the veritable *chef d'œuvre* of Neolithic art (Figs. 271 and 272). There is a complete series of characteristic forms easy to distinguish, and each is represented by numerous examples. In the first or oldest type there is practically no differentiation between blade and hilt; both are very thin, as is seen when the edge is turned toward the observer. The edges curve with perfect regularity from the point to the end

FIG. 271. MIDDLE STAGE IN THE EVOLUTION OF THE SCANDINAVIAN FLINT DAGGER OR PONIARD.

The handle is thick, squarish in cross section and differentiated from the blade. Flint daggers were so numerous that it must have been the custom during the Neolithic Period always to carry one in the belt. Scale, *ca.* $\frac{1}{4}$. After Müller.

of the handle. The most remarkable feature is the long, narrow, shallow, parallel grooves passing obliquely from one edge to the other, produced by chipping. These parallel grooves always pass from the right upward toward the left, no matter by which end the specimen is held or which side is turned toward the beholder. If the blade were transparent, the parallel grooves of one side would be seen to cross those of the other. These results could only be obtained at all times by holding the piece of flint in a given position and by chipping always with the same hand. It could have been either the right or the left hand, probably the right. Parallel chipping is to be found in other flint-producing countries, but nowhere, with the possible exception of Egypt, was it so general or carried to such perfection as in Denmark. The second and third types are peculiar to Scandinavia.

The second type is also found in the megalithic monuments. The hilt becomes more and more differentiated from the blade and is thicker (Fig. 271). In the third type the greatest diameter of the thin blade is about midway between the point and the shank (Fig. 272). The breadth of the hilt is about the same at all points; a cross section of the hilt is approximately quadrangular. The corners are carefully chipped. This type is characteristic of the stone-cist epoch which comes at the close of the Stone Age.

In 1910 Sterjna attempted a coördination of the Neolithic in Scandinavia with that in western Europe as follows:

| Scandinavia | Western Europe |
|---|---|
| 4. Bronze Age | 4. Bronze Age |
| 3. Epoch of the dolmens | 3. Robenhausian Epoch |
| 2. Epoch without stone graves | 2. Pressignian of Capitan; Spiennian of Rutot |
| 1. Epoch in which stone implements were not polished | 1. Campignian Epoch |

### *France*

In France, an early epoch of the Neolithic Period, known as the *Campignian*, has been differentiated; it corresponds approximately to the epoch of the kitchen middens in Denmark. The type station is the village site of Campigny near Blangy-sur-

FIG. 272. FINAL STAGE IN THE EVOLUTION OF THE SCANDINAVIAN FLINT DAGGER OR PONIARD.

The one in the center is the longest and the one on the right the finest ever found in Denmark. Both the blades and handles are retouched with consummate skill. Scale, ½. After Müller.

Bresle (Seine-Inférieure). A section through the habitation site revealed three distinct archeological layers: (3) vegetal earth with Neolithic industry which included polished implements; (2) yellow clays composed largely of refuse of Campignian age, containing typical Campigian industry in abundance—picks, paring knives, scrapers, spokeshaves, etc., also potsherds but no polished stone implements; (1) the hearth proper, composed largely of ashes and charcoal, in which were found numerous implements and potsherds, also of Campignian age, but no polished stone implements. The

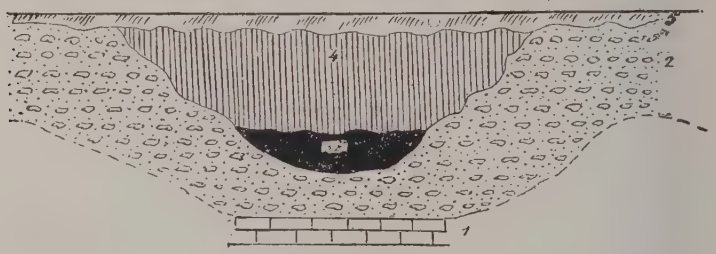


FIG. 273. SECTION THROUGH THE NEOLITHIC HABITATION SITE AT CAMPIGNY, SEINE-INFÉRIEURE, FRANCE.

This is the type station for the Campignian Epoch. 1, Chalk; 2, gravels with remains of a mammoth; 3*F*, hearth (charcoal and ashes) with Campignian industry (length, 2.10 meters; breadth, 1.80 meters; thickness 0.45 meter); 4, yellow sandy clay (fill), 1.20 meters, Campignian industry; 5, vegetal earth containing polished flint implements. Scale, $\frac{1}{75}$. After Salmon, d'Ault du Mesnil, and Capitan.

hearth was excavated in Quaternary gravels, the latter resting on the Chalk (Fig. 273).

The culture at Campigny represents an early stage of Neolithic culture before the art of polishing stone as a shaping process was known. Among the flint implements were noted Mousterian and Magdalenian survivals, also new forms including the pick and paring knife (Figs. 274 and 275). Pottery, both crude and fairly fine (without ornamentation), and milling stones prove that the population no longer depended primarily on the chase and that the first steps toward the conquest of the soil had been taken.

### *Switzerland*

An epoch known as the *Robenhausian* was recognized by de Mortillet; he made this epoch fill the entire gap between the Tarde-

noisian and the Bronze Age. The type station is a Swiss lake dwelling in the small desiccated Lake Pfäffikon, canton of Zurich. This site, discovered in 1858, is situated some 3,000 meters (1.9 miles) from the shore, with which it was connected by means of a bridge. There were three superposed deposits alternating with sterile layers (peat), all dating from the Neolithic Period. There is evidence that the first and second villages had been burned successively, while the last had simply been abandoned.

The piles of the lowest (oldest) village were round. Among them were found stone implements, bones, potsherds, and artifacts made of wood and horn; also the products of a well developed textile industry — thread, strings, network, woven fabrics, fringes, and tassels.

FIG. 274. FLINT PICK FROM CAMPIGNY.

The pick makes its first appearance with the Campignian Epoch in this unpolished form. Scale, ½. After Salmon, d'Ault du Mesnil and Capitan.

The second settlement at Robenhausen also succumbed finally to a conflagration. It is separated from the lower station by a peaty layer about 1 meter (3.3 feet) thick. It yielded woven fabrics, nets, sherds, pottery vessels (complete), and objects of stone, wood, and bone; also grains, fruits, and remains of domesticated animals—cattle, sheep, and goats. Perforated stone hammers and axes, types which were lacking in the lower station, were found. Among other things, clay crucibles for the melting of bronze and copper were found; in three, copper or bronze adhered to the crucibles, indicating that this station belonged to the close of the Stone Age or beginning of the Bronze.

FIG. 275. FLINT PARING KNIFE FROM CAMPIGNY.

The Neolithic tool maker knew how to produce a straight edge without recourse to the polishing process. Scale, ⅔. After Salmon, d'Ault du Mesnil and Capitan.

The third, and last, station was separated from the second by a peaty layer 1 meter (3.3 feet) thick. In this station the piles were mostly of split, instead of round, timber. It was never burned but seems simply to have been abandoned. In it were found stone hatchets (numerous but small) and objects of nephrite and jadeite, but no textiles.

The entire settlement at Robenhausen covered about one hectare (2.5 acres). Among the animal remains should be mentioned species no longer living, as *Bos primigenius* and bison; of species still living in central Europe there may be mentioned the stag, roebuck, chamois, wild boar, wolf, fox, wildcat, hedgehog, etc., also many species of bird and fish. Very few human remains were found, and these were fragmentary.

Hardly another lake dwelling can compare with Robenhausen in respect to seeds; over fifty kinds of plants were represented, most of them cereals—two kinds of barley, three of wheat, millet, etc. Agriculture was an important industry. Remains of flax—root, stem, and seeds, as well as woven products, are abundant. The lake dwellers of Robenhausen did not need to wear skins, for they made linen cloth, and probably also woolen cloth, though none of the latter has been preserved. They certainly had sheep. Cloth was dyed, the principal colors used being red (hematite), yellow (yellow weed, *Reseda luteola*), and blue (danewort, *Sambucus ebulus*). Oak was preferred for piles, but several other kinds of wood were also employed. Nuts were used quite extensively for food. The water nut (*Trapa natans*) was abundant, and berries of all kinds were gathered.

The Robenhausian is the equivalent of the *Spiennean* of the Belgian authors. It witnessed the beginning of megalithic monuments, lake villages, and fortified camps; it also witnessed the exploitation of flint mines on a large scale, especially in France, Belgium, Holland, and England.

The lake-dwelling epoch of Switzerland belongs in part to the Neolithic Period and in part to the Age of Metals. Basing his system on data gathered from the former class, Heierli recognized three phases of the Neolithic Period, each represented by a type station. For the first epoch the type station is Chavannes (Schafis) near Neuville. The remains of wild animals were more

numerous here than those of the domesticated animals. The textile art had made its appearance, but there was no ornamentation on the pottery or on the tools and weapons.

The second epoch is characterized by a brachycephalic population. The remains of domestic and wild animals occur in about equal numbers. Well fashioned stone axes, especially of jadeite, nephrite, and chloromelanite, occur. The type station is Moosseedorf.

The third epoch is one of transition from the Neolithic to the Bronze Age. Numerous tools, weapons, and ornaments of copper occur. Remains of domestic animals predominate. The population was in part dolichocephalic and in part brachycephalic. The type station is Vinelz (Fenil).

### *Belgium*

In Belgium, three phases of the Neolithic Period are recognized by Hamal-Nandrin and Servais: the *Omalian,* Campignian, and Robenhausian or Spiennean. The Omalian is an early phase, characterized by the complete absence of polished flint implements and of the ax properly so-called, also by the presence of pottery. It is represented at some four hundred stations in the Province of Liège alone. Campignian type specimens in Belgium include the paring knife and the pick. It is seen to good advantage at Fouron and Saint-Martin.

### *Phœnicia*

At Nahr-el-Kelb, Phœnicia, 7 kilometers (4.37 miles) from the Mediterranean, are three caves, in one of which evidences of Neolithic occupation were found, especially flint chips, polished stone axes, chipped and polished chisels, saws, punches, points, chipped scrapers, potsherds, and animal bones.

Southeast of the hamlet of Harajel is a cave from which animal bones and many potsherds have been taken. Near the entrance to this cave Zumoffen found a Neolithic workshop which yielded scrapers, points, nuclei, hammers, and a rough draft of a fine ax ready for polishing. The pottery from Harajel is coarse and friable, not well baked if fired at all.

Ras-el-Kelb, a station on a promontory of the Syrian coast pre-

viously mentioned as a Paleolithic site, also includes sites occupied by Neolithic man. It was first explored by Tristram, and later by Dawson in 1884. Zumoffen found cultural remains in the breccia as well as on the surface. The implements include scrapers, points, punches, and saws, also chipped and polished axes and chisels, and perforated shells. The numerous shaping stones, nuclei, polishers, and chips show that the manufacture of implements took place on the spot.

Ras Beyrouth is the name given to an ensemble of worked-flint deposits in the sands which stretch to the southwest of the city of Beyrouth along the Mediterranean shore from the promontory of Ras Beyrouth to the southern extremity of the dunes. It seems that once there was here an extensive series of Neolithic workshops, now for the most part covered by sands. Mixed with this workshop débris are Neolithic potsherds as well as sherds and other débris representing practically every phase of post-Neolithic culture.

One hour from Sidon, near a brook called Zaharani, is a Neolithic workshop known as Nahr-Zaharani. Over an area 1,500 meters (4,925 feet) long by 400 meters (1,313.3 feet) wide the soil is thickly strewn with innumerable flint chips. Here one finds blocks of flint and silicious quartz, shaping stones, nuclei, chipped axes with only the edge polished, chisels, points, scrapers, polishers, and chips. A few potsherds are mixed with the workshop débris.

At Gezer (late Neolithic to Iron Age) the rocky heart of the hill was found to be full of caves, partly natural, partly artificial. They vary largely in plan as well as in size. Some are mere shelters 2 to 3 meters (8 to 10 feet) square; others are series of chambers connected by doorways and corridors. The ceilings are generally less than 2 meters (7 feet) high. In the floor deposits of these caves were found flint flakes, knives, scrapers, and points; millstones; hearth and heating stones; polishers; rounded pebbles, etc.; fragments of pottery which was made without the use of the potter's wheel; perforated amulets of stone and bone. In one of the caves bones of a non-Semitic race were found.

Dolmens still abound in eastern Palestine. West of the Jordan dolmens are not so numerous, being confined to the district of Galilee, the neighborhood of Jerusalem, and the section between

Hebron and Gaza. Many of the Moabite dolmens resemble those of western Europe in that they are surrounded by one or more rings of stones. An interesting series of tumuli on the hills south of Jerusalem are still to be examined. Near Hizmeh, a village just north of Jerusalem, are five remarkable prehistoric stone monuments, known locally as the "Graves of the Children of Israel."

In southern Palestine, from Hebron to Ashdod, are caves consisting of labyrinthine groups of circular, square, or rectangular chambers hewn out of the soft limestone with great care. They vary in size and complexity. According to MacAlister, one cave contained no less than sixty chambers; caves with five, ten, or even twenty chambers, large and small, are not uncommon. One chamber was 122 meters (400 feet) long by 24.4 meters (80 feet) in height.

In the middle of the area bounded by Hebron, Ashdod, Gath, and Gaza, is the village of Beit Jibrin, the "House of Gabriel." This is the center of the cave district. The Gezerite cave dwellers north of Rephraim were still in the Stone Age when the hewers of the Beit Jibrin caves were beginning to use metal tools, as the pick marks testify, so that the cave-dwelling period of Palestine overlaps on the Age of Metals.

At the ruins of Jericho, according to Sellin, there are at least seven culture levels. They are as follows, beginning at the top:

*Byzantine*
*Late Hebrew*
*Hebrew*
*Israelite* ..... Iron Age
*Late Canaanite* ..... Late Bronze Age
*Canaanite* ..... Bronze Age
*Prehistoric* ..... Neolithic

A relative chronology for Palestine may be tabulated as follows:

B.C. 538.—Cyrus ordered Jerusalem rebuilt.
588.—Fall of Jerusalem, Babylonian captivity.
722.—Fall of Samaria, Assyrian captivity.
*ca.* 920.—Division of the kingdom.
925-960.—King Solomon.
960-1000.—King David.
1000-1200.—Judges.

Iron Age

1300.—Renewed occupation of Syria by the Hebrews.
1800.—Jewish immigration into Egypt.
2000.—Abraham.

Early Canaanites

3800.—Chaldean influence.

Bronze Age

4500.—Early Semitic invasions.

Age of Copper

B.C. 5000.

Neolithic Period

B.C. 5000-10,000 (or 20,000).

Paleolithic Period

B.C. 20,000-500,000.

### *Babylonia, Elam,* and *Amurru*

Babylonian historians of the third millennium B.C. have given us lists of kings and have furnished us with glimpses of their history as early as about 4300 B.C., when we find that the tribal state had long since passed, as well as the days of independent city-states, and that imperialism had already been established. The length of the period when the settlements in the valley gradually developed into cities and existed independently cannot be determined. There is, however, every indication that it was long, and the date 5,000 B.C. for man's entrance into Babylonia is a rational conjecture.

The first settlers who came into this great alluvial plain from the higher lands in Amurru, farther up the rivers, had already acquired a fair degree of civilization, since there were two prerequisites before permanent settlements could be established, namely, intelligence in harnessing the rivers and coöperation in controlling the floods. According to Professor Clay, there can be but little doubt that man learned the art of irrigation in the country to the northwest, in which region archeology has already determined a great antiquity for man:

IRON AGE

B.C. 1175-1750.—Cassites ruled Babylonia.
1800.—Hittites invaded Babylonia.
2080-2123.—Hammurabi.
2225.—First Babylon dynasty founded.
2300.—Rise of Assyria.
2357.—Nisin dynasty founded by Amorites.
2474.—Ur-Engur founded the third Ur dynasty.
2625.—Guti supremacy in Babylonia.
2850.—Sargon I founded the Akkad dynasty.
2875.—Lugal-zaggisi conquered western Asia.
2950.—Bau-ellit, a woman, founded the fourth Kish dynasty.

BRONZE AGE

3300.—Amorite supremacy in Babylonia.
3700.—Elamite supremacy in Babylonia.
4100.—First Erech dynasty, Age of Tammuz and Gilgamesh.
4300.—First Kish dynasty, Age of Etana.
5000.—Predynastic periods of Amurru, Elam, and Babylonia.

### *Egypt, Persia, and Crete*

The chronology of Egyptian cultures is as follows:[3]

| | |
|---|---|
| B.C. 1090-1200.—Twentieth dynasty. | IRON AGE |
| 1205-1350.—Nineteenth dynasty. | BRONZE AGE |
| 1350-1580.—Eighteenth dynasty. | |
| 1580-1788.—Thirteenth to seventeenth dynasty. | |
| 1788-2000.—Twelfth dynasty. | |
| 2000-2160.—Eleventh dynasty. | |
| 2160-2445.—Ninth and tenth dynasties. | ENEOLITHIC EPOCH |
| 2445-2475.—Seventh and eighth dynasties. | |
| 2475-2625.—Sixth dynasty. | |
| 2625-2750.—Fifth dynasty. | |
| 2750-2900.—Fourth dynasty. | |
| 2900-2980.—Third dynasty. | |
| 2980-3400.—First and second dynasties. | |
| | NEOLITHIC PERIOD |
| | PALEOLITHIC PERIOD |

[3] The dynastic dates are from Breasted.

According to Montelius, the Neolithic in Persia (Susa) began 20,000 years before our time.

The Neolithic began at Knossos in Crete at least 14,000 B.C. The following tabulation is adapted from Evans:

| | |
|---|---|
| | Iron Age |
| B.C. 1100-1350.—Late Minoan III. | |
| 1350-1500.—Late Minoan II. | |
| 1500-1600.—Late Minoan I. | |
| 1600-1700.—Middle Minoan III. | |
| 1700-1900.—Middle Minoan II. | Bronze Age |
| 1900-2100.—Middle Minoan I. | |
| 2100-2400.—Early Minoan III. | |
| 2400-2800.—Early Minoan II. | |
| 2800-3400.—Early Minoan I. | |
| 3400-14,000.— | Neolithic Period |

## Mining

Humankind makes greater demands on nature than does any other creature. These demands increase directly in proportion to man's advancement in civilization. As long as dead wood and surface flints sufficed to meet the needs of primitive man, the natural resources of the earth were not endangered. The troublous conservation problem may be traced to the users of Neolithic implements whose needs outran the pace of nature's supply. Neolithic man wanted more and better flint; this he obtained by mining. Freshly extracted flint, before it loses its quarry water, is much more easily worked than dead surface flint.

It is not definitely known to what extent Paleolithic man mined for flint; his operations along this line were probably simple and superficial. The best Acheulian and Mousterian implements appear to have been made of freshly quarried flint. A flint quarry of Mousterian age has been reported from Les Bouleaux, near Mâcon (Saône-et-Loire). The exploitation of quarry flint at El Mekta, southern Tunis, certainly took the place during Paleolithic times. Whether Reginald Smith is right in referring the earliest habitation of Grime's Graves and Cissbury to the Aurignacian Epoch is apparently still an open question. It is worthy of mention that at

Brandon, in the vicinity of Grime's Graves, the mining and knapping of flint is still carried on.

Flint mining became an important industry during the Neolithic Period; evidence of this is found in England, Sweden, Belgium, France, Spain, Portugal, Italy, and Sicily, and also in the New World. Two general systems were developed: (1) mining by "open cast" or trench and (2) by galleries and shafts (Fig. 276). These systems were probably developed in the order given. An excellent example of mining by "open cast" is that at Obourg (Hainaut), Belgium. The best known mines in which the gallery and shaft systems were used are those at Spiennes, also in Hainaut.

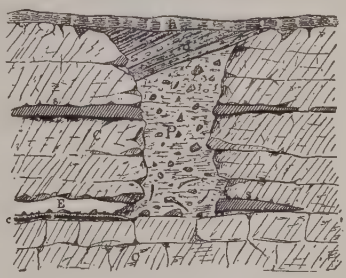

FIG. 276. SECTION OF A FLINT MINE AT MUR DE BARREZ, AVEYRON, FRANCE.

The primitive miners, disdaining the upper layer of flint, dug down till they reached the level of *E*. This bed they mined through its entire length. *C*, calcareous formation; *s*, beds of flint; *P*, filled in pit; *d*, clays and gravels; *c*, deposit of carbon on the floor of the cavity *E*. After Boule.

*Obourg.*—Access to a seam of fine black flint some 3 or 4 meters (9.8 to 13.1 feet) beneath the surface at Obourg was by means of parallel trenches in the side of a declivity. Here galleries were developed to some extent in connection with the trenches. In the construction of one of these galleries a miner met his death; his skeleton was found by de Munck and with it, apparently held in the hand, was a deerhorn. A workshop had been established near the mines at Obourg, and there Dubreux found many rejects, also a complete inventory of flint tools made from the excellent Obourg flint. In the mines, however, only deerhorn picks were found. Since the close of the Great War, Rutot found a second complete skeleton of a miner at Obourg.

*Strépy.*—Mining operations at Strépy were similar to those practiced at Obourg, except that there is no evidence of a workshop at Strépy; the one at Obourg probably served both mines. Two skeletons, one of a miner facing downward with limbs extended and one of a child, were found in 1905 at the bottom of a trench some 3 meters (9.8 feet) beneath the surface in the Roland

quarry. With the skeletons were the remains of a wild boar with enormous tusks and two deerhorn picks, but no implements of flint. The skeletons lay at the foot of a vertical wall of chalk and at the level of a seam of fine black flint.

*Spiennes.*—The flint mines and workshops at Spiennes were discovered in 1840 by Toillez. When the railway from Mons to Binche was put through in 1867–68, some twenty-five shafts of the Neolithic mines were exposed. At that time Neyrinckx found part of the skeleton of a child some 12 years old and the lower jaw of an adult male at the bottom of a shaft 12 meters (39 feet) deep. With these remains were found deerhorn picks, some intended for service in one hand, some for service in both hands. The Spiennes miners employed picks both of deerhorn and of flint, the latter being more abundant; pick marks are clearly to be seen on the walls. None of the flint picks seem to have been shaped by polishing. Hammers of sandstone were found in the shafts and galleries.

Not only were galleries driven in from the line of outcrop at Spiennes, but shafts were also sunk from the surface of the plateau above. These shafts occur over an area of more than 24 hectares (60 acres), the surface being almost everywhere covered with workshop débris, which is in places 91 centimeters (3 feet) deep. In order to reach the desired seam of flint, shafts were sometimes sunk to a depth of 10 or 12 meters (32.8 to 39.4 feet), passing through ten horizons of less satisfactory flint. The bottom of each shaft was widened into a chamber from which galleries were driven in various directions.

At the mouth the Spiennes pits are from 2.4 to 3.7 meters (8 to 12 feet) in diameter, becoming more restricted in dimensions as they descend, so that at the level of the desired seam of flint the diameter is not more than 1 meter (3.3 feet). At Grime's Graves some of the shafts have a diameter of 9.8 meters (32 feet) at the mouth and some 3 meters (10 or more feet) at the bottom, indicating that mining on the Continent was more advanced than it was across the Channel. At both Spiennes and Grime's Graves the shafts were used as dumping grounds for material taken out in digging new ones, and the partly filled shafts were employed as dwelling places.

The pottery found at Spiennes was coarse and badly baked. No lamps were found. The notches cut in the wall of at least one shaft are supposed to have held wooden beams, forming a staircase for ingress and egress. The galleries had a comfortable height of from 1.5 to 1.8 meters (5 to 6 feet). Rutot has reported the finding of two human skeletons at Spiennes since the Great War, but no implements were found with them.

*Sainte-Gertrude.*—A great flint mine and workshop have recently been explored at Sainte-Gertrude, just across the Belgian frontier in Holland. Hamal and Servais found not only a system of pits and galleries, but also deerhorn picks for mining. The station is, therefore, comparable with the Belgian Neolithic flint mines and workshops. At Sainte-Gertrude are found transition forms linking the paring knife with the ax.

*Grime's Graves.*—The prehistoric flint mines known as Grime's Graves, near Brandon (Norfolk), cover an area of some 8.4 hectares (21 acres). The area is said to be marked by 346 pits; only two of the pits and a few floors were excavated by a committee in 1914. Pit No. 1 has an average diameter at the top of 9.15 meters (30 feet) and at the bottom some 4.6 meters (15 feet). It is sunk to a depth of 9.15 meters (30 feet). Pit No. 2 is much larger, some 12.8 meters (42 feet) in diameter at the top and about 9.45 meters (31 feet) deep. From the base of Pit No. 1 four or five galleries radiate like the spokes of a wheel. The ends of some of these galleries tap neighboring shafts. The communications connecting the various galleries are of three kinds: wide, open doorways of about the same height and breadth as the galleries themselves; creepholes only large enough to crawl through; and still smaller openings presumably for ventilation. Each pit therefore no doubt communicated either directly or indirectly with all other pits by means of an elaborate system of galleries, creepholes, and ventholes.

The artifacts found at Grime's Graves include deerhorn picks (Fig. 277), an implement made from the tibia of the red deer, chipped and polished stone implements, crude pottery, and fragments of what might have been willow baskets which were probably used in carrying the finer materials. Flint mines were evidently lighted by lamps just as were the Paleolithic caverns.

Resinous torches may have been employed, but no remains of these have as yet been found. At Grime's Graves, Greenwell discovered four lamps, "one in a pit and others in the galleries, in one case placed upon a ledge of chalk in just the proper position for throwing light upon the place being worked."

Among the débris filling Pit No. 1, a human skull was encountered at a depth of 3.2 meters (10.7 feet); in Pit No. 2, part of a child's skeleton was found.

FIG. 277. DEERHORN PICK USED IN THE MINING OF FLINT, FROM GRIME'S GRAVES, NORFOLK, ENGLAND.

The Neolithic miner circled by means of a flint knife all the tines of a red deer antler except the brow tine. The circled tines were then easily removed from the main stem of the antler by a sharp stroke, leaving the main stem to serve as a handle and the brow tine as the pick. Scale, ⅛. From the British Museum Guide.

Excavations at Grime's Graves in 1920 brought to light a new chipping and occupation zone. The habitation level, immediately overlying glacial sand, yielded flint implements, bone tools, pottery, and two engravings on flint crust. This new zone was examined over an area of 30 square meters (36 square yards), down to a depth of 0.9 meter (3 feet), and proved to have been occupied at three successive periods, each occupation level being separated from the others by sterile deposits. According to A. L. Armstrong, who has made a special study of the successive deposits, the section reveals the following:

7. Roman and Romano-British pottery. Early Iron Age pottery.

6. THIRD FLOOR. Hammerstones, pot boilers, hearth, bone tools, whetstone, bronze tweezers, split animal bones. Bronze Age.

5. *Chalk rubble.*

4. SECOND FLOOR. Hearths, flint flakes, cores, two deerhorn picks, split bones. Neolithic.

3. *Chalk rubble.*

2. FIRST FLOOR. Hearths, bone tools, pottery, chipped flint implements and flakes, engravings on flint crust. Maglemose (?).

1. *Red sand.*

The most important engraving, a crude figure of either *Cervus elaphus* or *Alces machlis,* lay embedded in the upper portion of the red sand. The second engraving, representing the head and back of some animal, probably the hind, was found on the upper surface of the first floor. Both engravings are cruder than the well-known Paleolithic engravings and are evidently of post-Paleolithic workmanship; they probably represent the transition phase known as Azilian-Tardenoisian, or Maglemose.

*Cissbury.*—There are striking points of resemblance between the mines at Grime's Graves and those of Cissbury (Sussex) in the great size of the shafts; at Cissbury, these vary in diameter from 6.7 to 21.35 meters (22 to 70 feet) depending on their position on the hillside slope and the tilt of the flint seam. The depth of the pits varies from 6.1 to 11.9 meters (20 to 39 feet). The galleries radiate from the pits like spokes from a wheel hub, but there are no creepholes nor ventholes. Few deerhorn picks were found in the pits and galleries in comparison with the number found at Grime's Graves. Only three polished stone axes were found, one of which was only a foot from the surface. Part of a large vessel suitable for carrying was found. The water supply was presumably the spring at Broadwater, 2.4 kilometers (1.5 miles) distant.

FIG. 278. CHALK LAMP FROM THE FLINT MINES OF CISSBURY, SUSSEX, ENGLAND.

Like the cave artist, the Neolithic miner of flint required artificial light. This lamp was found on a ledge in such a position as to throw light on a miner at work. Scale, ½. From the British Museum Guide.

Chalk lamps, one of which still had blackened edges, were of a somewhat different type from those discovered at Grime's Graves (Fig. 278). Among the rubble that partly fills the pits are many flint chips, worked flakes, well chipped celts, ruder implements, a few boring tools, scrapers, stones that had been used as hammers, also rude pottery and charcoal.

At least two skeletons were found at Cissbury. The complete skeleton of a woman some twenty-five years old was encountered

within 0.76 meter (2.5 feet) of the bottom of the shaft. Judging from the position of the skeleton, the victim had fallen head foremost down the open shaft to her death. Estimated from the femur length, the stature was probably not over 1.5 meters (5 feet).

The second skeleton, that of a male, was found about halfway between the top and the bottom of a shaft. The interment had taken place at or near the surface after the shaft had been half filled. Such a sheltered spot would be looked upon as a suitable place for burial. The corpse was laid on its right side facing the east, the legs sharply flexed, bringing the knees to within a few inches of the chin and the heels against the pelvis. A handsomely chipped flint ax was placed in front of the knees, and the body was surrounded by blocks of chalk. Some eight shells of *Helix nemoralis* and a fire-marked pebble seem to have been buried with the body. This male was low of stature, since his femur length was 0.1 inch shorter than that of the female.

Other flint mines (pits without galleries) have been found in England at Massingham Heath, Chichester, Maumbury, Peppard, and Grimston Road. At Massingham Heath the pits were of large diameter but only 1.5 to 2.4 meters (5 to 8 feet) deep. One pit at Grimston Road has a diameter of 31.45 meters (90 feet). One at Chichester is 3.7 meters (12 feet) in diameter by 4.6 meters (15 feet) in depth.

A Roman amphitheater had been built over the pits at Maumbury Rings. One of the seven pits is 1.98 by 3.05 meters (6.5 by 10 feet) at the mouth and 6.25 meters (20.5 feet) deep. It is D-shaped in section like one of the Cissbury pits, and the straight wall has ledges apparently to enable the miners to descend and ascend. Judging from the nature of the pottery, the mines at Maumsbury are supposed to represent a later phase of the Neolithic than Grime's Graves. The deerhorn picks and fauna, however, are the same at both sites.

The discovery of a flint mine with picks and pick marks at High Wycombe (Buckingham) was announced in 1902.

*France.*—In France quarries have been reported from Bas Meudon (Seine) near Paris, Le Petit Morin (Marne), Nointel, Velennes, and Champignolles (Oise), Bellevue near Mur-de-Barrez

(Aveyron), La Petite-Garenne near Angoulême (Charente), and Portonville near Nemours (Seine-et-Marne).

*Sweden.*—Neolithic flint mines were discovered in southern Sweden near Malmö in 1903. The flint occurs in chalk but the chalk is not *in situ;* it consists only of loose blocks of various sizes brought by the ice and deposited between the ground moraine and the surface moraine. The flint was mined by sinking a shaft some 2.13 meters (7 feet) in diameter through the surface moraine and the chalk until the seam of flint was reached, at a depth of 0.9 to 3.05 meters (3 to 10 feet). The condition of the deposit prevented the driving of galleries, but small vaults were dug around the base of the shafts. Sometimes the shafts were driven so close together that the vaults at the base are actually in connection. As soon as the workings were finished, each shaft was filled. No workshop has been discovered in the immediate vicinity of these mines. The principal tool of the miner was the deerhorn pick; no flint picks have yet been found. A pottery lamp was discovered in one of the shafts.

The deerhorn pick continued to be used in mining operations long after the close of the Neolithic, especially in the mining of copper, salt, and tin, also of calcite used in the pottery industry. The deerhorn pick has been found in the mines of Cornwall, the calcite mines of Furfooz near Namur (Belgium), the copper mines of northern Spain, and the salt mines at Salzburg near Hallstatt in the Salzkammergut. In the case of the Salzburg mines of Austria and the Cangas de Onis mines of Spain, they were associated with stone wedges and copper or bronze picks. The deerhorn pick was also employed as an agricultural implement. At the Aramo mines in Spain and the Salzburg mines, the workings were lighted by fire sticks or resinous torches inserted into lumps of clay.

Everywhere the Neolithic methods of extracting the flint were practically the same, especially where local conditions were similar. The cultural remains also had many features in common—the deerhorn pick, the flint pick, the hammerstones, sometimes the stone lamp. Wherever workshops have been found in association with the mines, workshop products are similar.

That which is true of the artifacts is true to an equal extent

of the faunal remains. At Grime's Graves only 37 per cent of the mammalian species have been found associated elsewhere with Azilian culture. The balance is typically Neolithic. The list of mammalian remains found at Spiennes includes: badger, grizzly bear, wildcat, dog*, fox*, polecat, *Bos primigenius**, sheep*, ibex, goat, wild boar*, reindeer, elk, red deer*, roe deer*, hamster, pica, dormouse*, long-tailed field mouse, water vole, hare, rabbit*, mole*. Those starred were also found at Grime's Graves, which site yielded in addition several species not reported from Spiennes—horse, beaver, field vole, bank vole, and common shrew. Reginald Smith's contention that flint was mined at Grime's Graves and Cissbury as far back as the Aurignacian Epoch is not borne out by the fauna and must depend for its support on lithic typology, which, when taken alone, has doubtful value.

*Ohio.*—Extensive flint quarries have been explored by W. C. Mills on Flint Ridge in Licking and Muskingum counties, Ohio. The operations centered in Hopewell Township (Licking County). Within a radius of 1.6 kilometers (1 mile) from Clark's blacksmith shop as a center, Mills estimates the quarried area to be about 40 hectares (100 acres). The flint stratum varies in thickness from 45 centimeters to 1.8 meters (1.5 to 6 feet).

The quarrymen made use of granite and quartzite hammerstones varying in size up to 11.4 kilograms (25 pounds). Wedges made of wood or horn were used in dislodging the desired pieces of flint. The process of roughing out the blank forms was accomplished at the quarries. The third process, that of trimming blades or cores ready for transportation, took place at workshops in close proximity to the quarries. The bed of flint is near the surface, so that neither shafts nor galleries were necessary in exploiting it.

Mills states that none of the stone mauls and hammers used in quarrying had been hafted. There was no evidence to show the use of fire as a quarrying agent in any of the numerous sites examined by Mills, who does not believe that fire was used for the purpose either directly or indirectly. Blades and cores were the chief commodities manufactured at the quarry workshops. These commodities were transported to practically every portion of Ohio.

*Oklahoma and Arkansas.*—The chert quarries in the north-

eastern corner of Oklahoma, described by W. H. Holmes, have many points in common with Flint Ridge and the flint mines of Europe. The chert beds are thick, horizontal, and superficial. The excavations took the form of roundish pits, rarely more than 12.2 meters (40 feet) in diameter or 1.5 meters (5 feet) in depth; on the margins, however, trenches 30.5 meters (100 feet) or more in length were encountered. Shops were established on the margins of the pits, on the dump heaps, and at convenient points in the vicinity. Holmes mentions the finding of a deerhorn that had probably been used as a pick.

Novaculite quarries of even greater extent than the chert quarries of Oklahoma have been reported from Arkansas.

### Workshops and Land Habitations

Neolithic stations include both lake dwellings and land sites; the latter may be classed under several heads, such as villages, strongholds, isolated cabin hearths, and workshops. The workshop usually is associated with a village site. Caves, both natural and artificial, were also inhabited during the Neolithic Period.

A Neolithic village was composed of a number of simple rounded huts sheltering a shallow pit of the same shape. The walls were of poles and branches clothed on the outside with a coating of clay. The diameter of the huts ranged from 1.5 to 2.0 meters (4.9 to 6.6 feet). Sometimes a circle of stones surrounded the cabin pit. Huts were sometimes divided, one portion serving as kitchen and the other as bedroom. Huts of the Neolithic type continued in use during the Bronze and Iron Ages.

Some of the best known land stations are found in the province of Liège, Belgium; Grossgartach, east of Heilbronn (Württemberg); the valley of the Vibrata in Italy; Butmir, east of Sarajevo; Jablanica, Jugoslavia; and southern Russia.

The villages of the Hesbaye (Liège) in Belgium belong apparently to a rather late phase of the Neolithic Period. Judging from the character of ceramic ornamentation, they are synchronous with the second citadel of Troy and the third epoch of the Neolithic Period in Scandinavia.

The Neolithic village of Grossgartach, explored by Schliz, has revealed valuable data concerning Neolithic house construction. The ground plan is rectangular, approximately 4 by 5 meters (13.1 by 16.4 feet). The wall consists of upright staves, or small slabs, strengthened by a weft of withes running horizontally. This framework is plastered both inside and out, straw and chaff being used as a binder. A yellowish slip was applied to the inner surface. In one instance, apparently the chieftain's dwelling, a zigzag pattern composed of white and red bands was applied over the slip. Some 5 meters (16.4 feet) removed from the chieftain's dwelling was his stable.

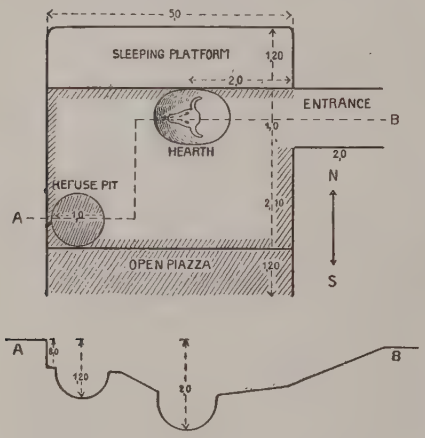


FIG. 279. GROUND PLAN AND SECTION OF A NEOLITHIC HOUSE AT GROSSGARTACH, SOUTHERN GERMANY.

Under the ashes in the hearth pit, Schliz found the almost complete skull of an ox (*Bos taurus*). The measures in the illustration are in meters. Adapted from Schliz.

According to Schliz, a typical ground plan at Grossgartach includes: (1) a sort of open piazza at one side or end; (2) an entrance, not necessarily by way of the piazza; (3) inside (*a*) an elevated space for a sleeping room, (*b*) a hearth in the main room, and (*c*) a refuse pit, usually in one corner of the main room (Fig. 279). In one of the hearths Schliz found an almost complete skull of *Bos taurus*. By way of comparison it is interesting to note that the refuse pits of the prehistoric village sites in Ohio are usually outside the tepee, as reported by Mills, who likewise found evidence that many of the pits were employed for the storage of supplies prior to their use as refuse pits.

Grossgartach belongs to an advanced phase of the Neolithic, as represented by polished stone implements with perforation for hafting and by two well-known ceramic types, the so-called *Schnurkeramik* and *Bandkeramik*. The incised patterns in a dark

paste are emphasized by a white filling. Nothing in the way of metal was found at Grossgartach.

The most important feature of the finds made at Butmir, Jugoslavia, is the ceramic ornamentation, in which the spiral and the chevron are the characteristic notes. There are three archeological horizons at Butmir characterized by the same types of stone industry. Examples of lithic industry including both chipped and polished implements are most numerous in the uppermost level. Clay figurines and sherds ornamented with spirals are most frequent in the lowest level, become rare in the middle horizon, and are entirely wanting in the uppermost. The huts were round, and sheltered round pits. Butmir possessed the combined characteristics of village and workshop; both pottery and stone implements were manufactured there.

Neolithic land habitations are chiefly centered along the principal water courses or river systems. They were likewise more plentiful in regions where flint abounded. Thus in France the principal sites are in the valleys of the Seine, Saône, Rhône, Garonne, and Loire. The department of Saône-et-Loire, central with respect to these river systems, is the richest of all in vestiges of Neolithic culture.

On the border between Saône-et-Loire and Côte-d'Or is the Camp de Chassey, one of the most important Neolithic stations in the whole of France. The camp is well situated on the summit of a narrow rocky plateau, the escarpments of which command every avenue of approach. The camp has a total length of 744 meters (2,442 feet) and a width varying from 110 to 205 meters (361 to 673 feet). At each end was an enbankment which rose to a height of 14 meters (46 feet) above the outside ditch. The cultural remains found at the Camp de Chassey [4] belong chiefly to the Neolithic Period; but the place continued to be occupied in the Bronze Age and for a part of the first epoch of the Iron Age. The Neolithic hearths and vestiges of habitations are numerous, as are also potsherds, flints, polished stone implements, and objects of bone and staghorn.

Among the other important Neolithic camps in France, there

[4] Dr. Loydreau's fine collection from this site is in the museum at Autun.

should be mentioned the Camp de Catenoy near Clermont and Camp-Barbet at Janville, both in the department of Oise; and the camp of Peu-Richard, commune of Thenac (Charente-Inférieure).

It would be difficult to separate the Neolithic fortified sites from those of the Bronze and early Iron Ages. All, however, averaged smaller in size than the great Gallic *oppida* of Cæsar's time. Fortified Neolithic camps rarely exceed in area 30, 25, or even 15 hectares (75, 62.5, or 37.5 acres). The camp of Peu-Richard measures 6 hectares (15 acres), that of Catenoy less than 5, and that of Mont Vaudois 2.5. Neolithic ramparts were constructed either simply of earth or of rough stones mixed with earth. Neolithic builders understood the value of supplementing ramparts by means of ditches, as may be observed at Catenoy, Chassey, and Peu-Richard.

A necessary concomitant of mining and quarrying of flint is the reducing of the quarry product into commercial shape. The waste must be eliminated; crude, angular masses of flint are converted into shapely nuclei or into implements of various kinds; hence the workshop may contain various by-products, broken, unsatisfactory implements, and stores of trade specimens.

Among the well-known Neolithic workshops in France, Grand-Pressigny (Indre-et-Loire) ranks perhaps first. The flint comes from denuded chalk deposits, is of fine quality, and of a color resembling that of beeswax. The first discoveries of workshop débris were made at La Villatte near Grand-Pressigny by the Abbé Chevalier in 1863. In the spring of 1864 Dr. Leveille discovered near his farm in the commune of Grand-Pressigny still vaster and richer workshops. During the same year the workshops were explored by Brouillet and Meillet and by G. de Mortillet.

Great quantities of flint nuclei of large dimensions had been left along the margins of their fields by the peasants, who dubbed these relics of a bygone age *livres de beurre* (pounds of butter). The nuclei were so numerous as to be a serious hindrance to field cultivation (Fig. 280). In addition to the nuclei, flint blades of exceptional length and other Neolithic flint implements of various kinds are found. Mixed with these there occur flint cleavers of the Acheulian type.

On account of its attractive color and quality, Pressigny flint became an important article of Neolithic commerce. Thanks to its exceptional color, the extent of the trade in Pressigny flint can easily be traced geographically. Examples have been found in 443 communes of France. They are reported as far south as Tarn-et-Garonne, to the east as far even as Switzerland and Italy, to the north in the Ardennes and Belgium, and to the northwest in Brittany.

FIG. 280. LARGE NUCLEI OF BEESWAX FLINT, SO CALLED BECAUSE OF ITS COLOR, FROM GRAND-PRESSIGNY, INDRE-ET-LOIRE.

Commercial flint in this form was produced by the ton from the Grand-Pressigny workshops during the Neolithic Period. Scale, ¼, with the exception of No. 1 which is ⅓. After Henri Martin.

Traffic in this flint does not seem to have existed prior to the Neolithic Period; it has never been found in Paleolithic stations, even those near-by such as the cave of La Roche-Cotard near Langeais and the caves of the Layon in Anjou. If the Paleolithic hunters made use of this flint, and there are surface indications that they did, it was for local consumption only. Saint-Venant is authority for the statement that commerce in Pressigny flint persisted into the Bronze Age, at least through the first part of it; evidence of this is afforded by specimens found in the dolmens

of Brittany and the Cévennes, also in a number of Swiss lake villages including Fenil (Vinelz) and Sutz in Bienne and Saint-Blaise (Neuchâtel).

In the communes of Laizé, Clessé, and Charbonnières (Mâconnais), extending for several kilometers along the banks of the Mouge, there existed important flint workshops. Judging from the numerous cleavers of the Acheulian type, workshop activity might have been inaugurated here in Paleolithic times; it certainly continued through a part of the Neolithic Period.

The Graig-lwyd site, Penmaenmawr, Wales, is a combination of quarry and workshop and in many respects is comparable with the well-known stations of Cissbury and Grime's Graves. At these latter the material utilized is flint, while at Graig-lwyd the material is felsite, an intrusive igneous rock which forms the high crags of Graig-lwyd. With the exception of the summit, the ax-working sites are situated for the most part on the shales below the dominating crags; the workmen evidently made use of the fallen blocks.

Hazzledine Warren's diggings were confined chiefly to two spots, Floor *A* on the German prisoner's path and Floor *B* on the slopes at an elevation of 228.75 meters (750 feet O.D.), just at the foot of the scree below the original position of the crag itself. At this site a large majority of the axes found are thin-polled, the pointed-poll type being comparatively rare. The pointed poll is the older form, and both antedate the epoch of the dolmens. No pottery was found; if any had existed its chances for preservation in loose scree on an exposed mountain side would have been limited.

A Neolithic workshop of Robenhausian age was discovered south of the Forest of Fontainebleau at Villiers-sous-Gres (Seine-et-Marne). At the station known as La Vignette, an excellent quality of lustrous gritstone was exploited. Among the specimens found there Capitan mentions nuclei, scrapers, hammerstones, anvil stones, paring knives, blanks for axes, and a species of tool with one plain unworked face and one raised and completely chipped, and vaguely formed triangular and quadrangular prisms.

In 1921 A. de Mortillet described a workshop (Saint-Prix) in the Forest of Montmorency, near Paris, similar in every respect to La Vignette. The raw material is gritstone, and the imple-

ments made of it are enough like those from La Vignette to have been the product of the same workmen. The rough drafts for axes from both La Vignette and Saint-Prix have their counterparts in many French Neolithic stations. This is true of certain of the Dordogne sites, especially La Merigode, also of the big workshops of Vienne and Champignolles (near Gisors).

## Lake Dwellings

Ever since man (or his precursor) lived in trees and disputed with wild beasts the possession of caves, the housing problem has had its serious aspects. Safety and comfort have always been the chief desiderata. Ways of attaining these have depended, in part at least, on local conditions. In a country of lakes and dense forests, lake dwellings would have the double advantage of being naturally well lighted and of being provided with a ready-to-hand water highway. Such dwellings also brought their occupants near to the ready means of sewage and refuse disposal, and served the added purpose of attracting fish and facilitating the catching of them. Moreover, lake dwellings offer an easy means of defense, partly because of their open situation.

Pile houses were built also in swamp lands and over streams. It is highly probable that they were likewise built on the solid land as a means of security against the ravages of rodents. Prehistoric pile structures on land however, have decayed, leaving no trace of their former existence, so we are indebted to those built over water and in swamps and bogs for the data that have made it possible to reconstruct the prehistoric pile dwelling (Fig. 1).

The use of the pile dwelling was widely distributed over Europe during the latter part of the Neolithic Period and the Age of Metals which followed. The principal center of this type of culture was Switzerland and the adjacent countries of southern Germany, Jura and Savoy in France, northern Italy, and Austria. The structures were quadrilateral and often were grouped in villages of considerable size. Several hundred pile-village sites have been discovered in Switzerland alone since the exceptional drought of 1853–54 brought the first one to light.

Some stations were inhabited during both the Neolithic and the Bronze Age; others date wholly from the Neolithic or wholly from the Bronze Age, the latter stations being farther from the shore. In some cases the same name is applied both to a Neolithic station and to a near-by Bronze Age station. Rarely have they

FIG. 281. HAFTED STONE IMPLEMENTS FROM THE NEOLITHIC PILE VILLAGE OF FONT, LAKE NEUCHÂTEL, SWITZERLAND.

Photograph by Tschumi.

been found in Europe to persist into the Iron Age or subsequent epochs. According to Peake, the pile villages of England are limited to the Ages of Bronze and Iron.

The terremare of the Po valley are low, flat hillocks which owe their existence to pile dwellings built on land but protected by water

artificially regulated. Over one hundred belonging to the Bronze Age have been explored thus far. The crannogs of Scotland and Ireland are also pile dwellings or stockaded islands.

All three classes of stations resemble the lake dwellings of certain primitive peoples living to-day in various parts of the world (Philippine Islands, Celebes, Nicobar Islands, and certain parts of Africa). In all three, conditions for the preservation of objects common to the daily life of the lake dwellers are exceptionally good. Our knowledge of the manner in which many tools and weapons were hafted, of the textile industry, and of the grain cultivated is largely due to these pile-dwelling deposits (Figs. 281 and 282).

The great drought of 1920–21 was a period of unusual activity in the exploration of pile villages. The waters were so low as to expose to view lake-dwelling remains never before visible. Stations previously described as isolated and separate units were found to be connected, proving the existence of pile villages much greater in extent than had hitherto been suspected. As examples one need only cite Corcelettes on Lake Neuchâtel and Saint-Sulpice on Lake Geneva near Lausanne.

FIG. 282. HAFTED FLINT DAGGER FROM THE NEOLITHIC PILE VILLAGE OF VINELZ, LAKE OF BIENNE, SWITZERLAND.

Photograph by Tschumi.

Vouga took advantage of the low water to make important excavations and observations at certain stations on Lake Neuchâtel, notably at Auvernier and Saint-Aubin. The conclusions he has been able to draw relative to culture sequence are apparently of far-reaching consequence. At Auvernier, Cortaillod, and Saint-Aubin, he found a basal Neolithic deposit separated from superposed Neolithic deposits by 60 centimeters (23.6 inches) of sterile sand. The flint implements from this low level at all three stations are made of a dark, translucent variety not employed in the later horizons. This early Neolithic level in all three stations is also characterized by a peculiar type of staghorn socket for stone axes and by well baked pottery of a fine quality. The staghorn socket

has no shoulder. In the middle Neolithic deposit, the staghorn sockets for axes have a well developed shoulder, and the pottery is cruder than at the lower level. In the third culture-bearing level (late Neolithic) from the bottom, the pottery is crude; the staghorn sockets have a shoulder and may also have a cleft base (Fig. 283). At the fourth level from the bottom (Eneolithic) are found

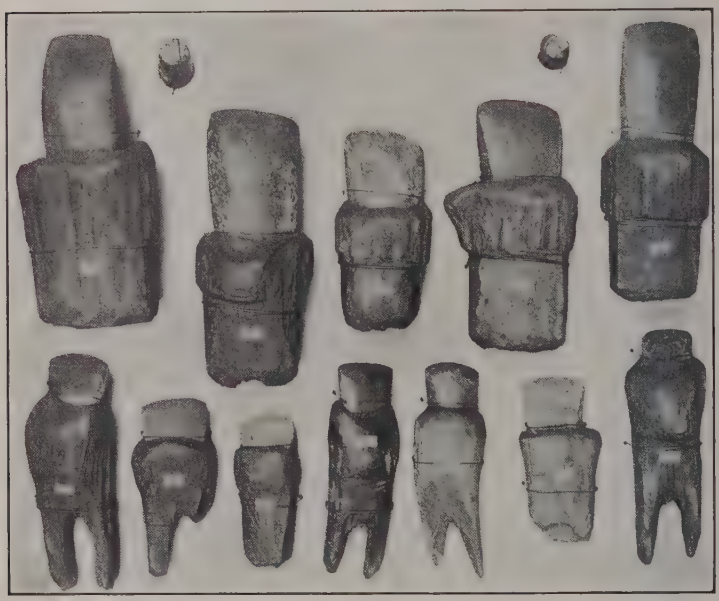

FIG. 283. THREE TYPES OF STAGHORN SOCKETS FOR AXES, FROM THE PILE VILLAGE OF VINELZ, SWITZERLAND.

These distinct types characterize the three successive culture levels in the Neolithic pile villages. Numbering from left to right starting with the upper row the types are divided as follows: No. 1, first or oldest type without shoulder; Nos. 2–5, second type with shoulder; Nos. 6, 7, 9, 10, 12, third type with shoulder and cleft base. Photograph by Tschumi.

the first copper objects associated with flints from Grand-Pressigny (Indre-et-Loire). The supposition is that the copper, like the Pressigny flints, was an importation from the west.

By the way of recapitulation, Vouga's contribution to Swiss lake-village culture may be summed up as follows:

AUVERNIER:

7. Eneolithic
6. Sterile layer
5. Upper Neolithic
4. Sterile layer
3. Middle Neolithic
2. Sterile layer (60 centimeters)
1. Early Neolithic

BEVAIX:

7. Eneolithic
6. Sterile layer
5. Upper Neolithic
4. Sterile layer
3. Middle Neolithic

CORTAILLOD:

5. Recent Neolithic
4. Sterile layer
3. Middle Neolithic
2. Sterile layer (60 centimeters)
1. Early Neolithic

SAINT-AUBIN:

3. Middle Neolithic
2. Sterile layer (60 centimeters)
1. Early Neolithic

COMPOSITE SECTION:

7. *Eneolithic.* First copper; flints imported from Grand-Pressigny, western France.
6. Sterile layer.
5. *Upper Neolithic.* Crude pottery with nonperforate protuberances; staghorn sockets with shoulder, also with cleft base.
4. Sterile layer.
3. *Middle Neolithic.* Crude pottery without ornament and with nonperforate protuberances; staghorn sockets with shoulder.
2. Sterile layer.
1. *Early Neolithic.* Fine pottery with perforate protuberances; staghorn sockets without shoulder; dark, translucent flints with unilateral chipping.

By early Neolithic in this connection is meant the early phase of the pile-village epoch of the Neolithic Period. It is of interest to note that in this lowest Neolithic level at Saint-Aubin, Vouga found a piece of wood hewn into a curve at one end; the straight base is highly polished as if the piece had been a sled runner.

The principal Swiss Neolithic stations are: Obermeilen (Zurich); Moosseedorf (Moossee); Robenhausen (Pfäffikon);

Schafis (or Chavannes), Möringen, and Vinelz (Bienne); Auvernier, Bevaix, Cortaillod, Font, and Saint-Aubin (Neuchâtel). The well-known Bronze Age stations include: Morges (Geneva); Auvernier, Corcelettes, Cortaillod, and Estavayer (Neuchâtel); Möringen (Bienne); and Wollishofen (Zurich); according to Viollier these stations do not antedate Bronze Age III. At Moosseedorf there are harpoons and microliths suggesting the Azilian and Tardenoisian.

Neolithic lake dwellers were fond of pendants made from animal foot bones (metatarsals) perforated for suspension, also perforated teeth and pendants of horn. At Concise II were found numerous amulets cut from the human cranium and perforated (one, two, three, or more holes); the margins were cut smooth. Some twenty examples are to be seen in the museum at Berne. Cranial drinking cups similar to those from Le Placard have been found in Neolithic pile villages of Schafis, Locras, and Sutz.

Neolithic lake dwellers of Switzerland developed the textile art to a high degree. They knew how to decorate their cloth with embroidery, conventional designs being employed for the most part.

All of the lake dwellings reported from various parts of England are said to be post-Neolithic. Reginald A. Smith has located a number in Yorkshire; lake dwellings of a similar kind have been discovered in Newbury in Berkshire. In 1851 and again in 1856 remains of lake dwellings were found in the Thetford meres of Suffolk. One of the best known is the lake village of Glastonbury (Somerset), dating from the late Iron Age.

Schmidt, Reinerth, and Kraft have been able to throw much new light on pile- and moor-village construction through recent explorations of the moors surrounding the slowly receding shores of the now much diminished Federsee. They find that during the third, or lake-village, epoch of the Neolithic Period, villages were built on piles and also directly on the moors without the pile substructure. In both types, the dwellings were alike in being large and built of heavy materials. The walls were composed of upright slabs.

The ground plan was rectangular and covered an area of 72 to 80 square meters (87.12 to 96.8 square yards). It was divided

into a rather large uncovered platform, a small combination workroom and kitchen with hearth and hand mill, and a combination living and bedroom with fireplace, loom, beds, etc. The two rooms were covered by a high-gabled roof with single ridgepole. The walls inside were plastered with clay and the chinks between the slabs on the outside were filled in with clay.

At a somewhat later phase of the Neolithic Period, the moor dwellings were much smaller and built of lighter materials. At one station Schmidt found a superposition showing, in section, underneath, a large pile dwelling, and above it a small moor dwelling. At the lower level there once lived a northern race; at the upper level, a Mediterranean race. The plan of the Neolithic pile and moor dwelling is the same as that of the four-sided houses at Troy. The so-called blockhouse of the log-cabin type did not appear until the Age of Metals. The Neolithic pile and moor villages were built of oak, beech, and birch, the later blockhouses of pine.

The Neolithic pile village of Bodman on Lake Constance covered an area of some 410 by 50 meters (1,343 by 163 feet) and the number of piles driven into the ground is estimated at 61,500. The builders of pile villages preferred a muddy bottom into which the piles might the more easily be driven. Once the piles were in place, stones were dropped about them to keep them more securely in position. Forked piles held the sills which supported the floors, made of small tree trunks either split (10 to 15 centimeters in diameter) or whole. The floors were carpeted with birch bark.

The principal Neolithic pile villages recently explored by Schmidt and his colleagues are in the basin of the Federsee, near Schussenried (Württemberg), namely, Riedschachen, Aichbühl, and Buchau-Dullenried. It was the author's good fortune to assist at the excavation of a Neolithic pile dwelling at Riedschachen in August, 1922, and later to visit the pile village at Unter-Uhldingen (Baden) on Lake Constance, reconstructed by Schmidt along the same lines that were employed by the Neolithic builders at Riedschachen (Fig. 284). For land villages belonging to the same epoch, the reader is referred to the station of Grossgartach, near Heilbronn.

It has been mentioned that the pile villages of the Bronze Age

are farther from the present shore line than those of the Neolithic Period. This circumstance is probably due, not so much to better facilities for construction and for better protection, as to the fact, pointed out by C. A. Weber, that the driest period of postglacial times was contemporaneous with the Bronze Age in Switzerland.

FIG. 284. RECONSTRUCTION OF A GROUP OF NEOLITHIC PILE DWELLINGS AT UNTER UHLDINGEN, ON LAKE CONSTANCE, GERMANY.

In the construction of a lake village, thousands of piles were driven into the mud at the bottom of the lake. The piles were often strengthened by stones heaped about them or by connecting braces. Cross beams were then fastened to the tops of the piles and round timbers laid across them and a layer of mud and gravel or of bark completed the floor. Piles of extra length were the main supports about which the rest of the huts were constructed. In every house was a hearth. The reconstruction illustrated above, which is based on data secured through recent investigations, shows a communal (left) and a private house (right). The railing which guards the approach did not exist in the original. After R. R. Schmidt.

It is therefore conceivable and highly probable that the Bronze Age pile villages were built in water no deeper than that encountered by Neolithic pile-village builders. The Bronze Age pile dwellings were of the blockhouse type, as were those of the Iron Age.

At Buchau, near Schussenried, Schmidt has uncovered a Hall-

statt (early Iron Age) village on a peninsula surrounded by two series of palisades. Just inside the inner palisade Schmidt found several hundred complete pottery vases, a lot of bronze rings (money), etc. The dwellings are of the blockhouse (log-cabin) type with a ground plan in the Mediterranean style. The house proper is built around three sides of an open court, one in line with its axis and the other two at right angles to the same. These two approaches separate the house proper from its two adjuncts, the stable and the service house.

During the seasons of 1916–19 the staff of the museum at Zurich explored an important pile village dating from the close of Bronze Age IV, situated on the Alpine Quai in that city. Among the objects recovered were bronze axes with wings, lance heads, socketed chisels, knives, razors, belts, bracelets, and pins of bronze; a bronze bridle bit with rattles attached, the whole thought to have been cast in one piece (broken or limber bit); bronze fishhooks, bronze vessels, spheroidal grooved and pitted stones; stone molds, including those for making the small rings that were used as a medium for exchange; polished stone hatchets, basketry, implements made of goat vertebrae (dorsal spine) and employed in the textile industry; wooden mallets; symbolic wooden horns in pairs; symbolic clay horns in pairs, and many other ceramic objects, including shallow bowls with incised geometric ornament inside, round-bodied vases with or without handles, perforated vases (openwork), effigy figures, rests for vessels, spindle whorls, spools in shape like those still employed, a large disk perforated at the center, probably a part of a fire-making apparatus. More than two thousand pottery vessels were found.

In 1917 Sulzberg discovered a Neolithic pile village in a bog at Weiher near Thaingen and has since explored it thoroughly.

## Pottery

Paleolithic cave man modeled in clay, but he was not a potter. Neolithic races were the first to take root directly in the soil, to become independent of the aberrant food supply on which the Paleolithic hunter and fisher had to depend. This was made possible largely through the domestication of animals and plants, the

development of agriculture, and the growth of the textile and ceramic arts. One of the first needs occasioned by such a change in the mode of life was for containing vessels, particularly those of an impermeability sufficient to contain liquids.

Among primitive human inventions, no other, with the possible exception of textiles, is so admirably adapted to serve both utilitarian and artistic purposes. Both pottery and textiles are the product of Neolithic culture; which of these two branches of human activity was developed first it would be difficult to say. Of the two, pottery requires a more sedentary mode of life on account of its fragility; again, the art of firing vessels of clay might have been discovered by placing an outside coating of clay on a basket in order to protect its bottom from the fire. In any event, the twin arts of pottery and weaving were among the early offspring of Neolithic culture.

The art of making clay paste, of tempering it, of fashioning it into vesicular forms, and of firing the same, must have had its origin early in the Neolithic Period. At first the paste was crude and the methods of firing the products were primitive. Improvement came with time and experience, and with it a taste for, and a skill in, ceramic decoration. The evolution of ceramic forms went hand in hand with improvement in the character of the paste employed. The potter's wheel was unknown. In western Europe the ornamentation was confined to figures incised, in relief, or in the round. In Egypt and in southeastern Europe painted pottery made its appearance. Pottery for ordinary domestic use seems to have been made locally in practically all Neolithic villages where the necessary materials could be obtained. Pottery making was, as it is to-day among primitive races, evidently woman's work.

*Clays.*—The Neolithic potter knew nothing of the complex chemical and physical problems involved in the making of his product. He learned slowly by experience that certain clays were better than others for his purposes. The need of a tempering material for his paste never entered his head. Fortunately for him, the clay generally contained approximately what was required; when it did not, the result was simply a failure and the experimenter began over again.

Franchet has examined a large number of common clays of the kinds that have been employed in every age by every people in the manufacture of pottery, and he always was able to detect the presence of nonplastic elements, especially sand, and in most cases in such a quantity that the crude clay constituted an excellent ceramic paste without its being necessary to add any other tempering ingredient. Clays that can be employed just as they are found in nature are not the exceptions but are met with frequently. It is thus practically certain that prehistoric pastes were often not the object of any special preparation whatsoever, nor was there added to them any tempering material. The primitive potters utilized clays that were found in the immediate vicinity of their settlements, profiting by the inherent natural hazards; they possessed no special formulae for the composition of their pastes.

*Paste.*—In addition to the water of constitution which all clays possess, more water must be added to obtain a clay paste; while this water remains in the mass of the clay, the latter is soft, nonresistant, and difficult to handle. It often happens that the clay, especially if it is composed of very fine elements, possesses so much plasticity that it adheres to the hands of the potter, making it impossible to work the clay. When the paste is too plastic, too compact, or too fine, it is apt to crack with the greatest ease, not only when it is exposed to the fire, but even during the preliminary drying in the open air. It is necessary, therefore, to diminish on the one hand the excess of plasticity by the introduction of nonplastic material (tempering ingredient), and on the other the excess of fineness by means of coarser materials.

It is very doubtful if the primitive potter made use of nonplastic materials from the beginning; it is more than probable that he made use of clay just as it was found, with whatever impurities it might contain. Among these impurities quartz sand nearly always occurs, constituting a natural tempering medium. At all events, whenever the nonplastic element consists of quartz sand, it is almost impossible to know whether its introduction was intentional or not.

Quartz sand and limestone, both often found naturally in the clay, were among the chief primitive tempering ingredients; the débris of shells was likewise often employed. At a very early

epoch use was made of small fragments of pottery which had already been baked. Pulverized charcoal, which is to be found in many kinds of prehistoric pottery, likewise constitutes a very good tempering medium, although it was probably employed for another purpose. Finally, mention should be made of certain other materials, very rarely employed, such as chopped straw and various minerals of rocks which the potters found in their neighborhood, minerals which varied according to the nature of the land in question.

*Technique.*—During the Bronze Age, especially towards its close, the technique became perfected; for certain pastes, especially in the pottery of the lake dwellings, testify to a fineness which presupposes the preparation of the clay by washing—washing no doubt of a rudimentary character destined perhaps to eliminate only the coarser materials which would interfere with the later incised and other decorations. When the western potters had reached this point, the eastern potters already possessed much more perfect ceramic pastes. Nevertheless, when it is said that in a certain country and at a certain epoch the paste of potters presents a fineness denoting a very advanced technique, one must not suppose that all the pottery of that region and time is fine; for in every country and in every epoch one finds simultaneously pottery with crude paste and pottery with fine paste. Even the Greeks, who have given us such splendid pottery, made cruder pottery at the same time for domestic use.

The primitive method of building a vessel began with the shaping of a bit of paste into a disk for the base. This was placed on a flat stone or other flat surface, and the walls were carried up by adding strips of clay until the rim was reached; very long strips were applied in the form of a spiral. The walls were dressed by means of the potter's wet hand and simple finishing tools of wood, bone, horn, shell, etc. With the body completed, the potter proceeded to the trimming, that is to say, the placing of handles, spouts, relief ornaments stuck on with a little slip (a batter made of diluted paste).

*Decoration.*—The pottery of the Neolithic lake dwellings reveals a very interesting process of decoration which consisted in the application of the bark of trees. This decoration continued

into the Age of Bronze. Metal, both tin and bronze, was employed as a decoration; these metallic decorations may still be found among certain primitive peoples of Asia and Africa. The decoration of pottery is often bound up with its impermeability.

The various methods of decoration are:

1. Smoothing by means of the wet hand.
2. Polishing by means of an instrument of horn, shell, or wood, but only on pastes made of fine elements.
3. Blackening of the paste by the introduction of pulverized charcoal or otherwise.
4. Giving luster by rubbing the pottery.
5. Glazing.
6. Incised decoration either before or after baking.
7. Relief decoration.
8. Incrusted decoration.
9. Appliqué decoration.
10. Painted decoration.
11. The slip.

The coloration of ceramic pastes may be considered as an element of decoration, for example in the black Etruscan ware, and even in certain Neolithic pottery. The paste may be colored naturally, in consequence of the presence of metallic oxides contained in its constituents, or colored accidentally by the addition of certain substances.

Primitive peoples employed three quite distinct techniques to obtain their black pottery.

1. In the charcoal pottery the paste is colored black throughout its mass and only slightly baked. By rubbing the surface the pottery becomes brilliant but does not possess the characteristic luster of smoked pottery; moreover, the black tone of charcoal pottery conserves a slightly grayish tint which is the more evident when this pottery is placed beside smoked pottery. The charcoal pottery was obtained by mixing pulverized charcoal with the paste. In addition, the low degree at which it was baked indicates that the heat did not surpass 550° C. and was hence very slightly reducing, and probably oxidizing, since the surface of the pottery does not become lustrous by rubbing, as the smoked pottery does.

The manufacture of black paste by the introduction of charcoal seems to have been in use especially during the Neolithic Period. This paste was, no doubt, more brilliant after being rubbed, the brilliancy being obtained by rubbing the paste before it was baked, by means of an instrument of wood, horn, or bone. The paste must present at least two special conditions: it must be very fine and somewhat hydrous. If too humid, the clay particles would be constantly displaced under the action of rubbing so that the surface would be too unstable to be polished. If, on the other hand, the paste is too dry, it would become reduced to powder under the action of rubbing, thus giving a mat surface.

Smoked pottery, even when made of coarse pastes, acquires under rubbing a remarkable brilliancy resembling luster. Smoked pottery may be subdivided into:

2. Pottery smoked in the mass, in which the paste is entirely colored black. To obtain this result it was necessary to expose the pottery from the very beginning of the making to the action of a very intense smoke. The most remarkable pottery smoked in the mass in spite of its low degree of baking is, without doubt, the Etruscan pottery that goes by the name of *buchero nero*.

3. Superficially smoked pottery. Among the primitive pottery we find a peculiar type, the paste of which is generally much baked and superficially covered on the exterior and interior by a very black coat which becomes brilliant on being rubbed. On breaking a piece of pottery of this kind one sees that the coat penetrates the paste only to a very slight depth, the center being simply colored brown or gray. Pottery of this kind is met with in South America, especially in Peru.

The slip, which plays such an important rôle in the history of ceramics, is an argillaceous earth, often a clay without the addition of any other material. It is applied by wetting or steeping, forming a very thin layer on the surface of the pottery. Its principal object is to hide the color of the paste, but it often constitutes a veritable element of decoration when, for example, it is placed only on certain parts of the vase or when it is employed for the decoration in relief.

*Molds.*—Molds were used at a rather ancient epoch. Molding is done by applying the paste against the walls of an object whose

form it is sought to reproduce. The paste can be applied either to the exterior or the interior of the mold, but in the latter case it is necessary that the mold be made in such a way that the piece can be extricated from the mold. Nevertheless, there are primitive ceramic pieces that were molded but that, by their form, indicate that they could not have been withdrawn from the mold (in case of a hollow mold), or that the latter could not have been extricated from the piece (in cases where the latter had been made by the application of the paste to the external surface of the mold). This peculiarity indicates that the mold was made of a material susceptible of being destroyed by the fire: the pieces as well as the mold were baked together. These molds were composed, for example, of fruits, of wooden objects, or of basketwork.

*The Potter's Wheel.*—One of the greatest improvements in the ceramic industry was the invention of the potter's wheel. The wheel not only facilitates the shaping of the pieces, but gives to them at the same time a regularity and symmetry which it would be very difficult to obtain otherwise; besides, the mechanical action of the workman modeling his piece during the rotating movement gives to the paste an absolute homogeneity.

Certain Cretan pottery of the Bronze Age would seem to indicate that the wheel appeared in the Orient during that Age, but we are not yet able to say just when it was introduced into western Europe. One may obtain a fair idea of the first wheels by studying those in use among living primitive races. The wheel in use among the natives of the lower Congo sheds light on what might have been the origin of the potter's wheel. On a flat clay surface firmly packed and hardened by fire, a quadrangular board about 5 centimeters (2 inches) thick is solidly attached by four pins of hardwood, one at each corner. This forms a fixed tabular surface. At the center of this surface is a perforation in which fits a strong cylindrical pin deeply sunk into the clay beneath and rising some 2 or 3 centimeters (0.8 to 1.2 inches) above the upper surface of the table. This pin forms a pivot of rotation. A little wedge set in a groove keeps the pin from moving. Upon this absolutely immovable system fits the plate. This is round in form and thick, with a round socket at the center passing halfway through the plate and fitting over the head of the pin. The lower surface of the

plate, therefore, rests lightly on the upper tabular surface beneath, and rotates without much friction when the plate is set in motion by the hand. This rudimentary wheel is in reality very much like the primitive *tournette* still found in Brittany.

All primitive peoples who still have no knowledge of the wheel and shape the piece entirely by hand, take care to choose as a rest for the vase either a flat stone or a thick board. The potter sooner or later must have noticed that instead of causing the piece to turn on the stone or board, it would be more simple to give to this support a rotating movement, and thus the primitive wheel such as used in the lower Congo had its origin. The fixed board became the rotating plate put in motion by the hand. Then came the second improvement: the pivot of rotation was lengthened, the plate became fixed, and the lower tabular surface became movable, the motive power being the foot.

The *tournette,* ancestor of the wheel, seems to have been in common use in the Orient, and the ruins of Thebes have revealed to us in a series of pictures that the Egyptians also made use of it. One still finds in Brittany, especially at Quimper, the ancient potter's wheel. It is much lower than the modern wheels, and the rotating part is the wheel of a vehicle, which causes the workman to give to the apparatus its rotating movement, not with the foot, but with a pole held in the hands.

The discovery of the potter's wheel caused a great revolution in ceramic art, not only because this apparatus permitted the potter to work rapidly at the same time giving to the vessel its correct contour, but especially because it helped him to vary the forms in a most remarkable manner. Among the diverse ceramic types there is one which, more than any other, has taxed the sagacity of archeologists by the persistence with which it is found throughout the entire world and dating from various epochs: it is the cup-shaped vase, the point of departure of every form created on the wheel. It is the shape that the potter would naturally produce if he were given a wheel and told to make a vessel for the first time. This is not true, however, of modeled forms.

*Baking.*—We do not have precise documents concerning the processes of baking employed in prehistoric times, but we can gather some information concerning it from (1) the physical character of

the pastes, (2) their chemical character, and (3) data gathered from living barbaric races. The supposed existence of very primitive pottery simply dried in the sun is hardly admissible, because a pottery the clay of which still contains its water of constitution, is not adapted to domestic use. We know that prehistoric pottery in general was very little baked, but the baking was sufficient to eliminate the water of constitution, which disappears at a temperature between 400° and 500°, that is to say, around nascent red. The only class of ceramic products employed in an unbaked state among primitive peoples is brick.

Of the three methods of arranging pieces destined to be subjected to the action of fire, the Neolithic potters made use of but one; they simply piled the pieces together, one on another, without order. This method was probably in use until the discovery of glazing. It could be employed not only in baking in the open air, but also in a furnace. Heierli noted at Rumlaug near Zurich a ceramic factory, dating from the close of the Neolithic Period, which contained a hearth represented by an oval pit 2 meters long by 1.5 meters wide (6.6 by 4.9 feet). Giraux found a pit somewhat similar in the department of Seine-et-Marne. The existence of these pits does not tell us very much in itself; but if we compare them with what we see among primitive peoples of Africa and America, their meaning becomes more clear. In the lower Congo the hearth is ordinarily an excavation in the soil. In South America the baking takes place in the open air without a furnace and without any other envelope than the burning wood. Sometimes the pieces are piled in a rather shallow pit sunk in the soil; in Brazil, however, a pit is dug deep enough so that the largest vase can stand erect without being above the level of the ground; the pit is filled with branches which are then burned.

As regards the use of bellows, seen in certain parts of the Congo, Franchet does not believe they were used during the Neolithic Period, for their use would have prevented reduction, and we know that prehistoric pottery, from its nature, was actually baked in a reducing fire. Baking in a pit already represents some progress, because we find among primitive peoples processes which are still more rudimentary. In Kabyl the pots are piled up on the surface of the earth, one against the other, and baked in the open

air. Among the Mandja of the French Congo the pots are placed on the surface of the earth in a pile which is then surrounded by branches; the baking lasts a day, after which the pots are removed by means of a stick while still very hot. The first improvement in the method of baking, as already mentioned, was evidently the baking in a pit or excavation.

Among the operations necessary in the manufacture of pottery, there are three of prime importance: (1) drying; (2) heating to remove the water of constitution; (3) baking. If pottery containing a large quantity of water is suddenly exposed to the fire, the water is too rapidly converted into vapor, causing the pottery to crack. It is indispensable, therefore, that the drying processes should be slow in proportion as the pieces are thick. They are first placed in the shade; then as the paste hardens, the pottery is exposed to the sun, where the drying process is completed. This process of drying in the open air is at least the one that was, and that still is, employed by all potters using primitive methods.

After the drying in the open air, which eliminates the paste water and at the same time produces a diminution of the volume of the paste, one proceeds to the heating for the purpose of removing the water of constitution (an intermediate state between the unbaked and the baked), requiring a temperature of above 400° C. After this the vessel loses its plasticity and becomes porous. The baking, properly so-called, has for its purpose the combining of the constituent elements of the paste, giving it special qualities of which the first is solidity. In consequence, unbaked pottery may be defined as pottery merely dried in the open air, not having been subjected to any fire action and still containing its water of constitution; its plasticity can be brought back to it by the addition of water. On the other hand, pottery that has been heated to redness, causing it to lose its water of constitution, cannot be reconverted to a plastic state; although porous, it possesses a certain degree of solidity which permits its use for domestic purposes. Finally, baked pottery is that in which elements have been combined at least partially, the baking having reached the stage between 800° and 1200° C., according to the composition of the paste; baked pottery is solid and more or less sonorous depending on the combination of its elements.

Hence, when the paste of a pottery mixed with water becomes plastic, such pottery has never been submitted to the action of fire. This test has been tried by Franchet on many sherds of primitive pottery, and in every case the pottery proved to have been subjected to the action of fire, even Neolithic sherds. During prehistoric times the baking was produced at first simply by means of a wood fire burning in the open air. In any fire in the open air the flame is composed of three principal zones: (1) a central gaseous zone in which the combustion is nil and in which the temperature is not at all high; (2) a median zone formed of gases, the combustion of which is incomplete (this middle zone is rich in carbon monoxide and is therefore reducing); (3) an exterior zone rich in oxygen and in which the combustion is complete, in other words, an oxidizing zone. The limit which separates one zone from the other is not at all distinct, one grading into the other. The reducing zone is yellow and gives off light; the oxidizing zone is blue and does not give off light. Heated in contact with air, wood commences to decompose at 140° C.; in proportion as the temperature rises, decomposition increases and different reactions take place: carbon combines with oxygen to form carbon monoxide and carbon dioxide. In addition, carbon combines with hydrogen. The combustion of the fire burning in the open air is incomplete because the wood is very rich in carbon and because the flame in its upward movement does not carry with it a sufficient quantity of air; the proof of this is that a part of the carbon is found to be carried upward without having been burnt, producing smoke. It is, therefore, comprehensible that pottery baked in the open air finds its way into a medium more or less reducing but never completely oxidizing. This peculiarity will explain certain characteristic facts concerning primitive pottery.

The custom of firing pottery in the open air ceased to exist three or four thousand years ago, at least in certain countries, notably in Egypt, Chaldea, and Persia; one has only to examine the pottery to see that the furnace or oven was already in use. Combustion in the furnace is by no means the same as in the open air; it is more complete by reason of the draught produced, by virtue of which one can cause a considerable volume of air to penetrate into the furnace according to the manner in which the draught is regulated.

*Decoration and Classification.*—The earliest Neolithic potters gave little attention to ornament, which for a long time was confined to patterns produced by the fingers, to relief decoration, and to incised figures. The painting of pottery came much later; in fact, painted pottery does not occur in the Neolithic of western Europe, though it did make its appearance in southeastern and eastern Europe.

Many attempts have been made at classifying Neolithic pottery, but all are based more or less on heterogeneous characters and are valid only to a partial degree, if at all. One of the first classifications is based, for example, in part on the technique of the decoration and in part on its style. It recognizes two great groups of Neolithic pottery, that with string or cord imprints (*Schnurkeramik*) and that with banded decoration (*Bandkeramik*). The ornamentation of the first group consists in the application to the fresh paste of the string, made of horsehair or plant fiber, firmly enough to leave a distinct imprint, the application being in horizontal series. The ornament is applied by preference to the neck of the vessel. The second group comprises pottery ornamented by lines or bands either continuous or broken and either incised or punctate. The lines or bands thus formed are disposed in such a manner as to produce a variety of patterns—chevrons, spirals, wave motives, etc. String pottery belongs to the Neolithic Period and was widely distributed over central and western Europe from Lake Ladoga and East Prussia to England, Spain, and Italy (Fig. 285).

Pottery with band ornament is likewise spread over a vast territory comprising the greater part of Europe. It seems to be lacking in the British Isles. As was the case with the string-ornament group, the band-ornament group includes many varieties depending on both form and ornament, arising from various centers. Authorities still disagree as to which of the two great groups is the older. They agree, however, that neither dates as far back as the early Neolithic Period.

According to Goetze and Reinecke, the pottery with band ornament belongs to the close of the Neolithic Period and the early Bronze Age and is thus essentially later than that with string ornament. The ornamentation is produced by incised lines forming banded patterns and covers practically the whole of the vessel.

Reinerth finds that each type of ceramic ornament goes with a special type of stone ax. Both types of ax are perforated for hafting; the one associated with the ceramic band ornament is short, with a thick, rectangular pole, whereas the one associated with the string ornament is long and slender with both ends sharpened.

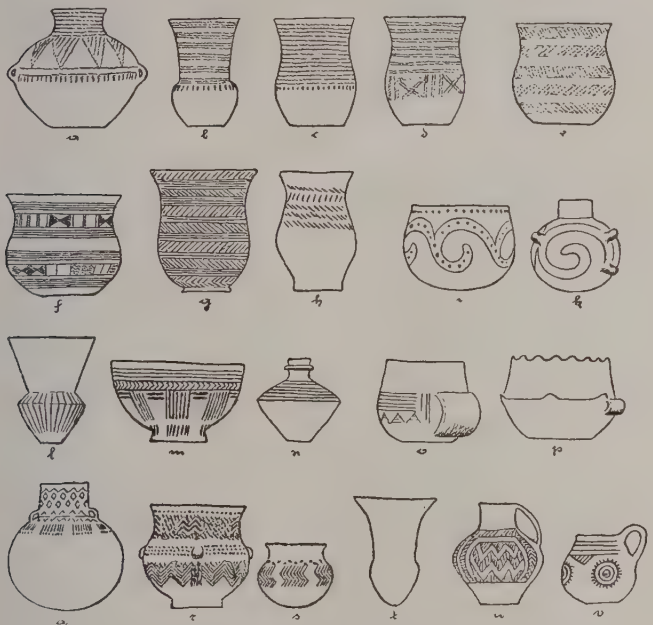

FIG. 285. EXAMPLES OF NEOLITHIC POTTERY FROM CENTRAL EUROPE.

*a–d*, with string ornamentation; *e*, *f*, with zonal ornamentation; *g*, *h*, with combination of string and zonal ornamentation; *i*, *k*, with banded ornamentation; *l–n*, northwest German types; *o*, *p*, Bernburg type; *q*, globular type; *r*, *s*, Rössen type; *t*, pile-village type; *u*, Schussenried; *v*, Mondsee. After Goetze.

In pottery of the band-ornament type from the pile dwelling at Laibach (Carniola), the spiral is wholly lacking. Instead, one finds patterns of concentric circles or semicircles. There are also zones formed by horizontals and broken by groups of vertical lines. The zigzag is a common motive. So far as ceramic ornament is concerned, Hoernes would place Laibach on a higher plane than Butmir.

It was soon found necessary to subdivide the string-ornament group on the basis of form; thus the caliciform or bell-shaped group was created. All other forms of string-ornamented pottery, including the amphorette and goblet, retained the original name of the group. They have a wide distribution over central and eastern Europe. The caliciform group is distinguished from the parent group not only by its form but also by its ornamentation and geographic distribution. The decoration, which consists of horizontal zones, covers the entire vessel instead of stopping two-thirds of the way down the side.

FIG. 286. CALICIFORM VASES FROM FINISTÈRE.

That on the left is from the dolmen of Rosmeur, Penmarc'h (height, 14.5 centimeters); that on the right, from the passage grave of Crugou commune of Plovan (height, 15 centimeters). After du Chatellier.

Caliciform vases are well-known in France, especially in the Pyrenees, Provence, the Seine valley, and Brittany. The passage graves of Finistère and Morbihan have yielded fine examples of this ceramic type (Fig. 286). Caliciform vases of southern Germany and southern Scandinavia belong to the last phases of the Neolithic Period; in the British Isles, Spain, Portugal, and southern France, they are referred to the beginning of the Bronze Age. Caliciform pottery is also found in the lower Vistula, the region of Budapest, the upper Danube, Czechoslovakia, the Rhine valley, and Holland. According to Montelius, it originated in the East,

since it resembles certain vases from Asia Minor and Egypt which date from 3000 B. C.

There is one group of pottery distinguished by facilities for suspension, such as perforate protuberances, holes through the body of the vessel near the rim, etc. The group is composed of a variety of forms and is found preëminently in northern Germany and Scandinavia.

The Germans distinguish more or less local types, such, for example, as the Bernburg, Rössen, and Altheim types. Rössen is a Neolithic inhumation cemetery in the Province of Saxony. The

FIG. 287. POTTERY VASES FROM RÖSSEN, DISTRICT OF MERSEBURG, GERMANY.

Vases of this design are peculiar to Rössen and represent what is called the Rössen type. Scale, *ca.* $\frac{1}{5}$. After Schuchardt.

Rössen type (Fig. 287) is a product due to the mixture of two elements, the northern German *Bandkeramik* and the Bernburg type.

House urns made their appearance in Scandinavia, Germany, Albania, and Italy during the early Iron Age. They are so named because of their resemblance to a house with door, roof, etc. A combination between the house urn and the face urn is found in the region of the Harz Mountains. With the exception of the door-like opening on the side, the urn resembles more a human effigy than a house (Fig. 288).

In France Neolithic pottery is chiefly represented by discoveries in the dolmens of Brittany and Aveyron and in camps and village sites. At the Camp de Chassey (Saône-et-Loire) it is represented by a variety of forms. The region of the Pyrenees has yielded a

special type of pottery with short, teat-shaped legs (Fig. 289) which recalls the tripod vases found in large numbers in the second city of Hissarlik.

From the viewpoint of Neolithic ceramic art, Butmir, near Sarajevo in Jugoslavia, is perhaps the most important station in Europe. The use of the potter's wheel was unknown at Butmir. The Butmir potters seem to have specialized in human female clay figurines, some represented as clothed and some nude. These figurines were found in huts rather than in the graves and are obviously to be regarded as household deities. Among the vases there are numerous varieties of form and ornament, many of the spiral and wave decorations being extremely beautiful (Fig. 290). Stocky thinks the station of Butmir is not old enough to be considered the starting point for banded pottery. He had opportunity in 1917 to make a careful study of all the Butmir material and found fragments of painted pottery, the presence of which prior to that time had not even been suspected; he also points out that at the station of Klakari in Bosnia, which is contemporaneous with Butmir, a copper arrowhead was found.

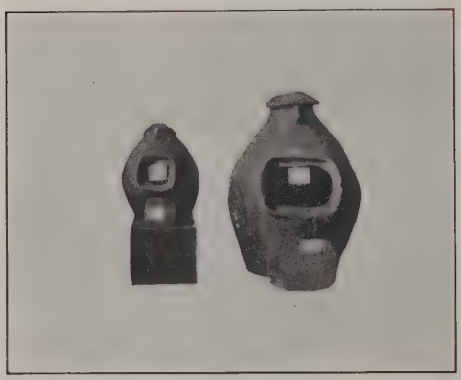

FIG. 288. URNS FROM EILSDORF ON THE HUY, GERMANY. EARLY IRON AGE.

These urns are combinations of the house urn and face urn, a type found in the region of the Harz Mountains. Photograph by the author.

The station of Cucuteni near Jassy in Rumania has yielded some remarkable human figurines of clay covered with spiral patterns (Fig. 291), also pottery vessels and various implements of stone and bone. The presence of a few bronze needles would seem to indicate that the station is one of transition between the Neolithic Period and the Bronze Age.

According to A. Stocky, the Neolithic Period in Bohemia is

divided into two parts: an older, represented by a purely autochthonous culture, and a younger, represented by imported cultures. The fusion of these imported cultures with the autochthonous gave rise to the oldest type of Bronze Age culture, known locally as that of Unêtice. The early Neolithic Period in Bohemia is characterized by banded pottery and a polished stone ax in the form of a smoothing iron; this culture extends easterly into Moravia and Silesia, southerly into Lower Austria, and westerly as far as the

FIG. 289. LATE NEOLITHIC POTTERY VASES WITH TEAT-SHAPED SUPPORTS.

Nos. 1–3 and 5 are from the Pyrenees; No. 4, from Sardinia; and No. 6, from Bohemia. All except No. 2 have short teat-shaped legs. After Pothier and Pic.

Rhine (Fig. 292). Three steps in the evolution of banded pottery can be traced in Bohemia, the third step being the transition to the late Neolithic, characterized by pottery with punctate ornament. This punctate type of pottery in Bohemia should not be confused with the Hinkelstein type; the two groups are analogous but not identical. The punctate pottery in Bohemia is restricted geographically and is to be looked upon as having evolved locally from the banded pottery (Fig. 293).

### TEXTILES

There is no evidence that Paleolithic man had any knowledge of the textile art; his clothing of skins was held together by stitch-

ing done with bone and ivory needles. The textile art, a Neolithic invention, includes spinning, netting, knitting, weaving, embroidery, and the making of baskets.

By reason of the perishable nature of the materials employed, prehistoric examples of the textile art are extremely rare. The best preserved examples are those found in the Neolithic lake dwellings of Switzerland. In the oldest of the three successive villages at Robenhausen were found not only spindle whorls and loom weights of stone and clay, but also bundles of raw flax fiber, as well as knitted and netted fabrics, specimens of loom-woven cloth, fine and coarse linen thread, twisted string, and thick ropes (Fig. 294). Spindle whorls and loom weights occurred in the upper two villages, but for some reason all traces of textile fabrics themselves had vanished. Both flax and wool were employed by the weavers of the Swiss lake dwellings.

FIG. 290. NEOLITHIC POTTERY WITH SPIRAL AND CHEVRON DECORATIONS, FROM BUTMIR, JUGOSLAVIA.

These illustrations represent the dominant types of ceramic ornamentation at Butmir. After Hoernes.

Remains of Neolithic textile fabrics have been found in Switzerland especially at Lüscherz, Moosseedorf, Murten, Niederwil, Vinelz, and Wangen, in addition to Robenhausen. Crochet needles of wood have been reported from Möringen and also from Bodman, Lake Constance.. The step from braiding to weaving seems to have been easily taken. Examples of both taffeta and twill were found at Robenhausen. There was probably a simple loom in every household. Examples of both coiled and twined basketry have been found at Wangen on Lake Constance.

Silk, the only natural and continuous thread (unwound from the cocoon of the silkworm in lengths of from 500 to 1,000 meters, 547.2 to 1094.4 yards), was unknown in Neolithic times. In the school of experience primitive man learned by degrees that certain vegetal and animal fibers, although relatively short, could be bound together by twisting into threads of the required length, thickness, and strength. The first process in thread making is the stripping and cleaning of the fibers (called scutching); these are next straightened by carding; and finally the carded filaments are drawn

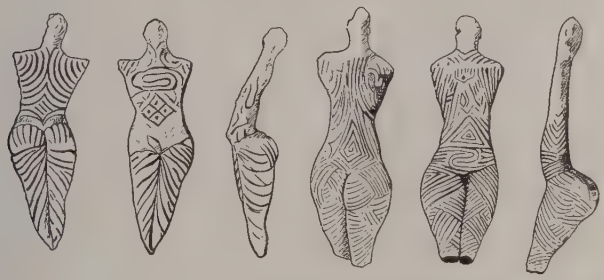

FIG. 291. NEOLITHIC CLAY FIGURINES WITH TATTOO PATTERNS FROM CUCUTENI, NEAR JASSY, RUMANIA.

The tattooing on these figures makes it seem probable that the human body was decorated in a somewhat similar fashion. Scale, ½. After H. Schmidt.

out in an even rove and twisted together into continuous thread—the so-called spinning process.

There are extant figures of Greek looms dating back to 500 B.C. in which the loom weights and other tools are similar to those from the lake dwellings. One may assume that the Neolithic loom was similar to and hardly less primitive than those figured by the early Greeks (Fig. 295).

Practically nothing is known of the number and kind of garments worn by either sex during the Neolithic Period. If one may be permitted to draw conclusions from certain rock paintings in Spain (Cogul and elsewhere), which probably date from the early Neolithic, women wore skirts fitting snugly at the waist and around the hips and short enough to reveal the calves of the legs (Fig. 138).

### Articles of Personal Adornment

The love of personal adornment probably dates as far back as the Mousterian Epoch. At La Quina one finds faceted masses of oxide of manganese, the coloring matter probably having been employed as a body paint. The Cro-Magnons made use of mineral colors in their mural art and no doubt also corporeally. Neolithic sepultures and village sites have yielded quantities of mineral colors, which were obviously applied to the body for æsthetic or martial reasons. If the human skin were imperishable, it would have much to reveal in regard to its treatment down the ages. Bearing on this subject are the clay figurines from Cucuteni near Jassy, Rumania, and from a Thracian tumulus near Philippopoli. The patterns on these figurines represent painting or tattooing (Fig. 291). Clay stamps that must have served for the application of coloring matter to the skin have been found in Neolithic caves of Liguria and in a stone cist of Derbyshire.

Fig. 292. Early neolithic clay vessels of the banded type from Bohemia.

The upper one is ornamented with a stylistic human figure. Originals in the National Museum at Prague. Photograph by J. Schranil.

In addition to painting and tattooing the body, Neolithic races, like their predecessors, were fond of ornament attached to the person or the clothing. Our information is based on imperishable articles, but it is reasonable to suppose that materials of a perishable nature were also employed.

Beads used either as necklaces or as a decoration for clothing are the most abundant. They occur in a bewildering variety of size, shape, and substance. Discoidal or globular forms predominate; cylindrical, biconical, and aberrant forms are also met with. The

materials employed are for the most part easy to work—amber, steatite, gypsum, slate, lignite, limestone, jet, etc. Beads made of hard substances such as amethyst, quartz, serpentine and flint are rare. Shell beads were often employed, especially on wearing apparel. Land and sea shells, both living and fossil, were utilized promiscuously. Bone beads were not uncommon. Schenk reports the presence of coral beads in the Neolithic sepultures of Chamblandes near Lausanne. Even tortoise shell seems to have been sought after in Neolithic times, judging from the evidence afforded by the finds at the Camp de Chassey, in certain French tumuli and caves, and in the pile dwellings at Laibach (Carniola). Whether beads of glass were known to the Neolithic races of Europe is still an open question. The few cases cited as bearing on the subject are not convincing.

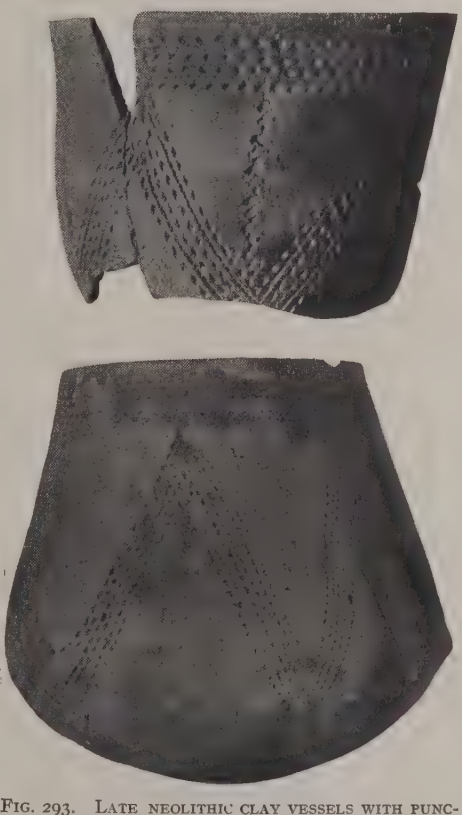

FIG. 293. LATE NEOLITHIC CLAY VESSELS WITH PUNCTATE DECORATION FROM BOHEMIA.

The banded pottery of early Neolithic times in Bohemia (Fig. 292), gradually developed into the type with punctate decoration shown above. Originals in the National Museum at Prague. Photograph by J. Schranil.

The pendant, used either singly or in series, continued to be a favorite ornament. Both organic and inorganic substances were

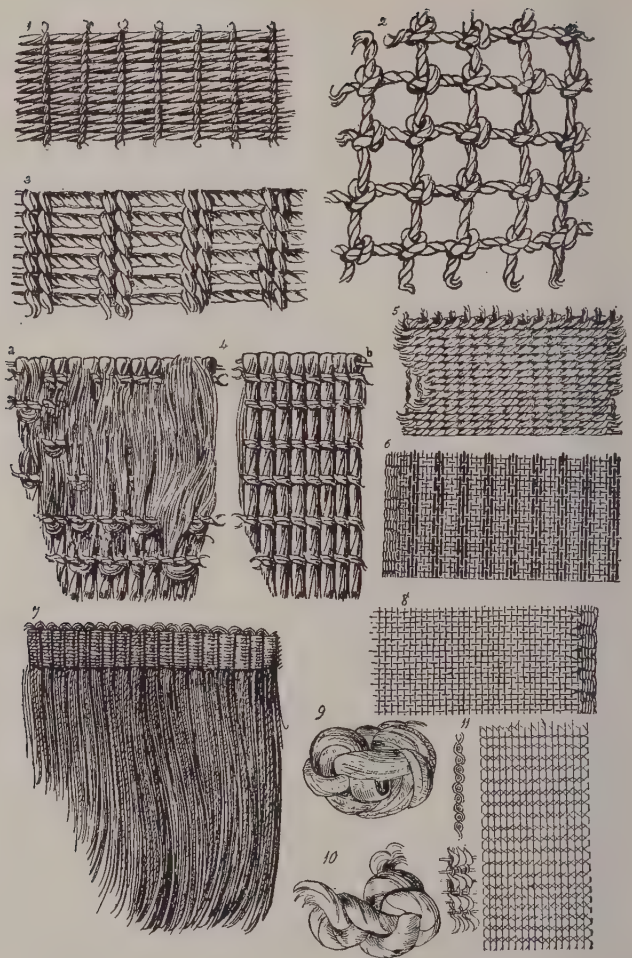


FIG. 294. EXAMPLES OF NEOLITHIC WEAVING, FROM ROBENHAUSEN AND WANGEN, SWITZERLAND.

The material in all is flax. Nos. 1–5 give examples of four kinds of platted cloth remarkable for their structure and accuracy of workmanship; Nos. 6–8 were made, not by hand, but by some weaving apparatus.

employed in its manufacture—teeth, bone, horn, shell, and stone. Frequently met with are the perforated canines of the wild boar, dog, fox, wolf, badger, and horse; also the incisors of the ox and beaver. Human teeth were sometimes employed in like manner. Another method of utilizing teeth as ornaments was to make a pendant of the entire mandible by means of perforations through the ascending branches. Examples of this sort are known to the Neolithic Period not only of Europe but also of North America.

It is a curious fact that both Paleolithic and Neolithic man made imitation teeth and shells. A fine Paleolithic example is the pendant of ivory in the form of a *Cypraea* shell, found by Daleau at Pair-non-Pair (Gironde). Neolithic imitations of teeth made of bone and stone have been found both in France and in Ohio.

Among Neolithic bone amulets should be mentioned the perforated disks cut from the human cranium, as well as those taken from other parts of the skeleton, both human and animal. Many of the Neolithic ornaments are presumably votive. To this class evidently belong the numerous small polished stone axes perforated for suspension.

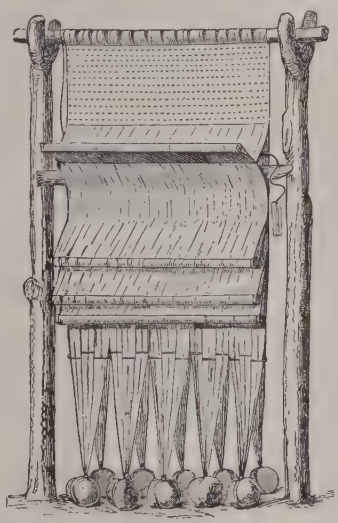

FIG. 295. RECONSTRUCTION OF A NEOLITHIC LOOM.

On a simple loom of this type M. Paur found it possible to make a great variety of excellent designs with ease. After Keller.

Bracelets had a place in Neolithic personal adornment. These were made for the most part of stone or shell. The special workshop for turning out bracelets discovered by Pérot at Montcombroux (Allier) probably dates from the Neolithic Period. He found here more than three thousand fragments of partly finished bracelets made of schist, together with the necessary tools for their manufacture. The Neolithic flint bracelets found at Abydos in Egypt are veritable works of art.

Ornaments made of amber, a species of turquoise (*callais*), and jadeite belong in a class apart, since they serve to throw important sidelights on Neolithic trade relations.

Fossil resin, known as amber, is found principally on the peninsula of Samland, eastern Prussia, farther west on both sides of the Baltic littoral, and on parts of the North Sea littoral. The greater part of the amber supply is washed up by the waves. Inland it is confined to deposits of lignite. Amber was rare during the Neolithic Period save in Sweden, Denmark, northern Germany, and Great Britain—countries nearest the source of supply. During the Bronze Age it spread rapidly over Europe. In Neolithic Scandinavia amber was worked into beads, pendants, and votive axes (Fig. 296).

FIG. 296. PENDANT OF AMBER IN THE FORM OF AN AX, FROM BOHUSLÄN, SWEDEN.
Scale, ¾. After Montelius.

A species of altered turquoise known in France as *callais* was much prized for its color. The original sources of supply have not yet been discovered. The hypothesis that it came from the Orient is not established, although its geographic distribution is not inconsistent with such a view, since objects made of it are found principally in regions bordering on the Mediterranean and the Atlantic.

The Neolithic tumulus of Tumiac (Morbihan) has yielded numerous beads and pendants made of *callais*. Other megalithic monuments of Morbihan have furnished their quota. Two other important centers are Portugal and southern France. It is interesting to note that beads of *callais* disappeared in the Age of Metals as soon as the art of making glass beads of about the same color was learned.

Nephrite and jadeite were highly prized by Neolithic man in part as articles of adornment and also in the manufacture of tools *de luxe*. Splendid examples, especially of polished axes, have been found in the megalithic monuments of Brittany, in the lake dwell-

ings of Switzerland, and elsewhere. The original sources of supply of nephrite and jadeite, like those of *callais,* remain in obscurity.

The use of obsidian or volcanic glass does not seem to have played so important a rôle in the manufacture of ornaments or tools in Europe as it did in the New World. The chief sources of supply seem to have been the Greek archipelago and southern Italy.

## Sculpture

The Paleolithic sculptor was concerned almost wholly with the realistic representation of his model. The matter of elimination or abbreviation of parts, or of their exaggeration, was of minor importance and seldom indulged in. The human female figure was one of the few exceptions, and even here the artist never reached the level of pure conventionalism. The cave artist developed a type represented by the Venus of Willendorf; the Neolithic sculptor produced a type embodied in the statue menhir. The difference between the two is not so much one of skill as one of viewpoint. Each in its way was redolent of the age that gave it birth and full of cultural significance.

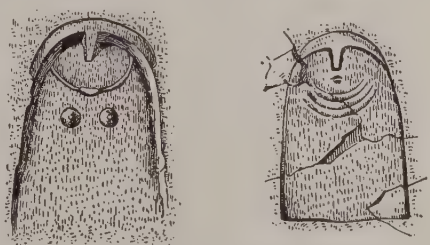

Fig. 297. Neolithic sculptured reliefs representing the human female.

These stylistic reliefs were found on the walls of antechambers of artificial Neolithic sepulchral caves in the valley of the Petit-Morin (see also Fig. 299). Color may have been used to complete the figure suggested by the carving. After de Baye.

Neolithic sculptured figures of the human female are found in certain sections of France, notably in the valleys of the Marne, Seine, and Oise, and in the departments of Gard, Aveyron, Hérault, and Tarn. There is a distinct family likeness running through the entire list, suggesting for all a common origin and meaning.

More than a hundred artificial Neolithic caves have been explored in the valley of the Petit-Morin (Marne); seven of these contain sculptured figures either of the human female or of the

ax. Each artificial cave consists of two parts, a sepulchral chamber and an antechamber. The female figures are sculptured on one of the walls of the antechamber and are obviously to be considered as representing guardians of the dead (Figs. 297 and 298).

It takes a lively imagination to complete the picture begun by the artist, who was content to sketch a few features only—the brow ridges, nose, a pair of breasts, a necklace, sometimes a mouth or a pair of eyes in addition. The work of the sculptor's chisel seems to have been supplemented by the use of color. At Coizard the large bead in the necklace still bore traces of a yellow color as if to suggest gold or amber; the eyes of the same figure are in black. Similar representations are to be found on the supports of certain passage graves of the Seine and Oise valleys, for example, Aveny (Eure) and Dampont and Épone (Seine-et-Oise). The same Neolithic female divinity recurs in several dolmenic sepultures of Gard, notably at Collorgues, where two examples were found. In both of these the idol was provided with diminutive arms but not with legs.

FIG. 298. NEOLITHIC HAFTED AX ENGRAVED ON THE WALL OF AN ARTIFICIAL BURIAL CAVE NEAR COIZARD, MARNE, FRANCE.

Since the ax was found on the wall of the antechamber to a sepulture, it probably was meant as a protection to the dead. The blade of the ax is painted black. Scale, ¼. After de Baye.

The region comprising Aveyron, Tarn, and Hérault is the home of the so-called statue menhir. More than a score of these sculptures have been reported. They differ from all the figures previously mentioned in being not simple bas-reliefs but veritable figures in the round, also in being complete and not confined simply to features of the bust. Some are provided with a belt, below which dangle two diminutive legs (Fig. 299).

Megalithic sculpture flourished in Brittany, examples being

found in some twenty monuments of Morbihan alone. The most remarkable series is from the passage grave of Gavr'inis, where twenty-two of the twenty-nine supports are completely covered by sculptured patterns. The principal motive has been aptly compared with palm and finger prints (Fig. 300).

FIG. 299. FRONT AND REAR VIEWS OF A NEOLITHIC STATUE MENHIR, REPRESENTING A HUMAN FEMALE, FROM SAINT-SERNIN, AVEYRON, FRANCE.

The arms and legs are visible in the front view; at the back they are hidden beneath a sort of one-piece garment held in place by means of a belt (see also Fig. 297). After de Mortillet.[1]

Representations of the ax occur not only at Gavr'inis but also in the dolmen known as the Table des Marchands, likewise in the dolmen of Mané-er-Hroeck. These Breton axes are hafted in a different way from those cut on the walls of the artificial caves of the Petit-Morin (Fig. 301). At the Table des Marchands there are groups of figures representing the ax handle alone. Another important motive employed by the megalithic sculptor has been referred to as *scutiform*. This shield-shaped motive is dominant

at Pierres-Plates. If the ax is to be glorified as a weapon of offense, why not also the shield as a means of defense (Figs. 302 and 303).

The spiral as a motive in megalithic sculpture is well represented in the British Isles, among the best examples being those from Lough Crew and New Grange in Ireland. These monuments date

FIG. 300. INTERIOR OF THE PASSAGE GRAVE OF GAVR'INIS, BRITTANY.
The walls are entirely covered with sculptured patterns resembling finger prints.

from the very close of the Neolithic Period or the beginning of the Bronze Age.

The Iberian peninsula also has its statue menhirs. Fine examples have been reported from Crato, La Esperança, and Ponte de Sôr, in Portugal. They have their counterpart in certain pictographs of Spain, notably at Peña Tú (Asturias), where painting is combined with engraving to produce the desired effect. Representations of idols in human form, both painted and engraved, have been found in certain Spanish dolmens at Corao near Abamia (Asturias) and at Cangas de Onis.

## The Burial Rite

The burial rite existed prior to the Neolithic Period, but pre-Neolithic burials were extremely simple, usually nothing more than an excavation in the earth in which the corpse was deposited. The limbs were sometimes flexed, a custom which persisted and was still further developed during the Neolithic Period. Rarely a stone or stones were placed about or over the remains, which were never incinerated intentionally.

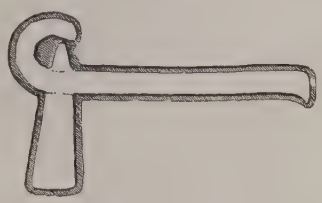

Fig. 301. Hafted ax carved on a stone from the passage grave of Gavr'inis, Brittany.

The hafting of this ax is of a type peculiar to Brittany. Compare with Figure 298. Scale, $\frac{1}{3}$. After de Mortillet.

During the Neolithic and later periods the burial rite gained in importance and underwent many modifications, both inhumation and incineration being practiced. The graves were individual as well as communal, and consisted not only of simple interments in any suitable site, but also of burials under erratic boulders and in natural and artificial caves. Another interesting practice was the construction of stone chambers, great and small as well as complex and simple, usually referred to as dolmens, to which we have already referred and will revert later in this chapter.

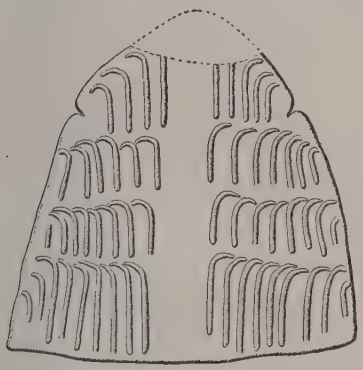

Fig. 302. Shield carved on one of the supporting stones of the dolmen known as the Table des Marchands.

The crozier-shaped figures at both Gavr'inis and the Table des Marchands (see Fig. 314) resemble representations of the ax handle. Scale, $\frac{1}{40}$. After de Mortillet.

*Burial in Artificial Caves.*—Closely related to the dolmens are the artificial burial caves, which, in part, reproduce the dolmenic plan and detail of ornamentation. The artificial burial caves may be studied to best advantage in the department of

the Marne, especially in the valley of the Petit-Morin, where they have been known since 1816, especially through explorations begun in 1872 by Baron de Baye. These caves are dug in a deposit of chalk. A trench leads to the cave entrance, which was closed by a stone slab. Some of the caves are simple; others are double, consisting of the chamber proper and an antechamber of smaller dimensions. The smallest cave measures 1.9 by 2.0 meters (6.2 by 6.6 feet); the largest 3.9 by 3.6 meters (12.8 by 11.8 feet). The height varies from 1.1 to 1.7 meters (3.6 to 5.6 feet). The Grotte des Fées at

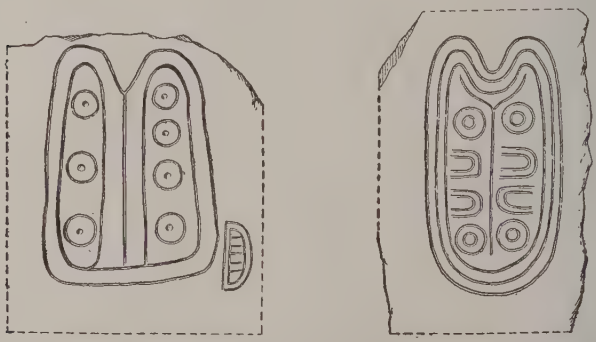

FIG. 303. SHIELDS CARVED ON THE SUPPORTS OF THE DOLMEN OF PIERRES-PLATES AT LOCMARIAQUER, MORBIHAN.

It is probable that the Neolithic sculptor believed that these shields would protect the sepultures which they adorned. Scale, $\frac{1}{20}$. After de Mortillet.

Fontvieille in Provence represents a dolmenic form intermediate between the passage graves and the artificial caves.

In several of these artificial caves, figures cut in low relief have been found, some representing a female divinity, others a hafted ax, both classes having religious significance and suggestive of a Mediterranean origin. Each cave contained several skeletons, nearly always complete; for the Marne they number all told about two thousand. The corpses were deposited full length, the arms generally parallel with the body. Since some of the largest caves harbored the fewest skeletons, Cartailhac believes them to have been funerary chapels either destined for certain ceremonial rituals or reserved for the sepulture of persons of high rank, perhaps military or sacerdotal.

The sepulchral accompaniments comprised especially axes of flint and jadeite, some still retaining their sockets of staghorn, knives, scrapers, arrowheads (those with transverse edges very abundant), bone objects, and ornaments, including amber and turquoise beads. Among the crania are several examples of trepanation and cranial rondelles or disks. None of the caves of the Petit-Morin valley has furnished any object of metal. The Baron de Baye's collections from this district are now the property of the National Museum of Antiquities at Saint-Germain-en-Laye. This mode of sepulture, so characteristic of the Marne, is rare elsewhere in France. It is not to be confounded with widely distributed subterranean refuges belonging to more recent epochs.

*Burial in Natural Caves.*—Many natural caves of western Europe, especially in France and Belgium, were utilized as communal burial places by Neolithic peoples. In many of these the Neolithic burials are superposed on deposits of Paleolithic age. A short list of the more important examples of Neolithic sepulture in natural caves in France is added for the benefit of the student:

Examples of Neolithic Sepulture in Natural Caves in France

*Ariège.*—Les Eglises; l'Herm; Montgrenier, valley of the Ariège

*Drôme.*—Cave of Châteauneuf-du-Rhône; cave of Clausail.

*Gard.*—La Baume des Morts at Durfort; Grotte des Morts near Durfort; Saint-Jean-d'Alcas (late Neolithic).

*Haute-Garonne.*—Aurignac; Penna-Blanque; Grottes de Saint-Mamet near Bagnères-de-Luchon.

*Haute-Saône.*—Grotte de Cravanche, 3 kilometers northwest of Belfort.

*Hérault.*—Grotte d'Aven Laurier.

*Landes.*—Duruthy cave at Sordes.

*Lorraine.*—Trous des Celtes, Moselle valley; Grotte des Geants, below the Maron valley.

*Lot.*—Combe-Cullier.

*Lozère.*—Grottes de Baumes-Chaudes near Saint-Georges-de-Levejac (in the two principal caves Prunières found an enormous quantity of human bones belonging to a dolichocephalic early Neolithic race); l'Homme-Mort, at Saint-Pierre-des-Tripieds (at least fifty skeletons of early Neolithic age).

As early as 1885 G. de Mortillet had already noted 117 natural caves, distributed over thirty-six departments, in which Neolithic races buried their dead. Dupont and others have made similar discoveries in Belgium, in the caves of Gendron, Chavaux, Schlaigneaux, etc.

*Burial under Erratic Boulders.*—In certain parts of France, burials under erratic boulders have been noted.

FIG. 304. SEPULTURE UNDER AN ERRATIC BOULDER NEAR BORDES, ARIÈGE, FRANCE.

Under this rock Regnault found at different levels two burials of widely separated epochs. After Regnault.

Near Bordes, at the intersection of the Riberol and Biros valleys in Ariège, is a great morainic deposit on which rests an erratic granite boulder 3.5 meters (11.5 feet) high by 4.2 meters (13.79 feet) in breadth. Under this Regnault found human burials in two horizons. In the lower horizon there was primitive crude pottery, also pottery with geometric designs. The upper horizon probably belongs to the Bronze Age (Fig. 304).

As early as 1842, at Crécy (Seine-et-Marne) Caro dug under an erratic block 5 meters (16.4 feet) by 3 meters (9.85 feet) in size, laying bare the remains of about fifty persons in three super-

posed layers. With the bones were polished flint axes, one still in its staghorn handle, serpentine amulets, a bone point, and divers chipped flints. No mention was made of pottery, though sherds were probably found there also.

In 1863, at the gates of Meaux (Seine-et-Marne), Caro found a second sepulture, at a place called La Justice, which furnished identical conditions. Under a block 5.5 meters (18.06 feet) by 4.2 meters (13.79 feet), larger than that at Crécy, excavation revealed the fact that a series of flagstones surrounded the great boulder, under which was a skeleton and fragments of pottery, also several beads. Erratic boulders serving the same purpose have been encountered at Meulan, Saint-Maur-des-Fosses, and other localities. Similar burial customs were common among the ancient Incas of the Peruvian highlands.

FIG. 305. NEOLITHIC BURIAL AS DISCOVERED IN A CEMETERY NEAR WORMS, GERMANY.

Note the partially flexed arms and legs and the clay vessel back of the head. Photograph by the author.

*Stone-Cist Burials.*—In their simplest form stone cists are composed of five flat stones, four of which are set on edge enclosing a rectangular space; the fifth serves as a cover. Cists, then, are the prototype of our modern coffin. They are encountered for the most part as simple interments without distinguishing surface mark. Sometimes they are found under dolmen tumuli surrounding a central sepulture. The stone cist is found in various departments of France, especially in Morbihan, Finistère, Charente, Vienne, and Lozère.

Fine examples of stone-cist burials are seen in the Neolithic necropolis at Chamblandes, near Lausanne, Switzerland. It is composed of small groups of from five to seven stone-cist tombs, each tomb with an east-west orientation. A cist measures a meter in length by a half meter in breadth and depth. In nearly every instance it contains two skeletons, a male and a female, the male being generally the first to have been interred. In exceptional cases a cist contained as many as five skeletons. The extremities were always flexed. The Chamblandes necropolis dates from near the close of the Neolithic Period.

FIG. 306. NEOLITHIC HABITATION SITE AT MÖLSHEIM, NEAR WORMS, GERMANY.

The man is pointing to the relic-bearing deposit. Photograph by the author.

The region of Worms (Rhenish Hesse) is noted for the number and richness of the Neolithic burials. The principal cemeteries are at Hinkelstein, near Monsheim; Rheindurkheim; Alzey; and within the city limits of Worms, on the Rheingewann. These all belong to the same phase of the Neolithic Period. The burials were in pits without any permanent protection. The bodies were placed on the side, with extremities flexed, or on the back. With the dead there were placed pottery vessels (Fig. 305), ocher, stone hand mills (especially in female sepultures), and other objects. Habitation sites have also been uncovered near Worms, at Mölsheim (Fig. 306). Mid-Neolithic cist burials on Green Island (La Motte), Jersey, have been described by R. R. Marett (Fig. 307).

## Megalithic Monuments

In contradistinction to Paleolithic man, Neolithic man was a builder. He was no longer content with such shelter as Nature afforded, either for himself while living or for his relatives after death. Some of his work in building was temporary; some, especially that which was destined as a place of sepulture, was permanent. He dug caves in the solid rock, but above all he erected

Fig. 307. End view of a mid-Neolithic cist burial on La Motte, Jersey.
Photograph by Marett.

monumental structures of stone which remain to this day the wonder and admiration of those familiar with the architectural problems involved.

The most imposing Neolithic architectural remains are those associated with the cult of the dead, usually referred to as megalithic monuments. *Megalith* means large stone; the term was officially adopted at the International Congress of Prehistoric Anthropology and Archeology in 1867 as the proper designation for monuments built of such stones. The term had already been employed in Morbihan, a region especially rich in megalithic monuments.

FIG. 308. THE ALINEMENT OF MÉNEC NEAR CARNAC, MORBIHAN. FRANCE.

Under this title are grouped structures of various types known in Brittany as dolmens, menhirs, cromlechs, and alinements. *Dolmen* is a Breton word meaning table (*dol*) of stone (*men*). The root *men* is also seen in *menhir,* meaning a stone on end. A menhir is a single long stone set on end. The dolmenic structure involves the use of several stones—at least one horizontal stone (the table) supported by other flat stones set vertically. The menhir and dol-

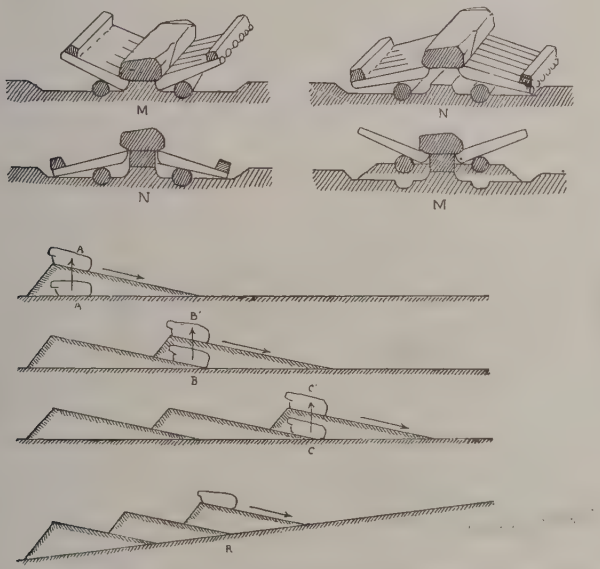


FIG. 309. POSSIBLE METHODS OF LIFTING AND MOVING HUGE MONOLITHS IN PREHISTORIC TIMES.

After Choisy.

men are the fundamental forms from which others are derived. A series of menhirs arranged in a circle, oval, or rectangle is called a *cromlech.* Menhirs placed in a series of more or less parallel rows constitute *alinements.* Dolmens are funeral chambers. They vary much in size and shape. Some consist of but a single chamber, others are multi-chambered.

In dealing with the Neolithic Period in Scandinavia, earlier in this chapter. it was thought best to give the dolmenic monuments

more than passing notice because of their intimate relation to the Neolithic chronology of that region. There remain for consideration a comparative study of the dolmen and the presentation of other megalithic monuments from various parts of Europe.

Although it would be impossible to say how many of the megalithic monuments of western Europe have been destroyed, we may assume that the distribution of those which exist is a fairly good

FIG. 310. THE FALLEN GIANT MENHIR AT LOCMARIAQUER, MORBIHAN, FRANCE.

This is one of the four great pieces that remain of the great monolith known locally as Men-er-Hroeck. Total length of the monolith, 20.5 meters (67.3 feet). Photograph by Mrs. David Fairchild.

index of that for any prior date. Their preservation in such large numbers is perhaps due in part to the web of myth, legend, and superstition which has surrounded them in all countries since the earliest historic times.

The cult of these stone monuments is reflected in the names still attaching to them. The most popular legendary name for a dolmen connects it with an abode for fairies—*maison des fées, tombe des fées, cave aux fées,* etc. There is even a greater variety of desig-

nations for menhirs—*dent, tombeau, affiloir, de Gargantua, grave de Roland, pierre au diable, pierrefitte, haute borne, pierre fiche, pierre aux sorciers,* etc.

The cult of megaliths is also reflected in the legend of Saint Cornély, patron saint of domestic animals (especially cattle), to whom the church at Carnac is dedicated. There is a legend that he fled from Rome pursued by pagan soldiers. In his flight two oxen carried his luggage. Arriving at the site of the present village of Carnac, with the sea before him and the soldiers still in pursuit, he miraculously transformed his pursuers into stones, which remain

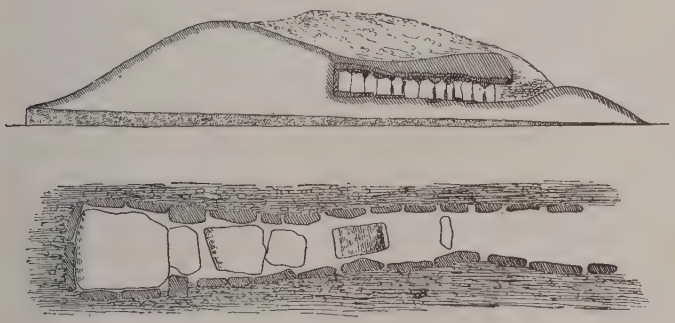

FIG. 311. SECTION AND GROUND PLAN OF THE PASSAGE GRAVE OF GAVR'INIS, MORBIHAN.

The ground plan shows how much longer the entrance passage is than the burial chamber, which is covered by the single large stone at the left. Total length of passage and grave, 12.5 meters (41 feet). See also Figures 300 and 301. After Déchelette.

to this day in the celebrated alinements of the immediate neighborhood (Fig. 308). The church marks the spot where Saint Cornély stood. In gratitude for the service rendered him in his flight by the oxen, he has ever since served as patron of their kind.

Something analogous to the annual autumn ceremony at Carnac may be seen at a little church not far from Brussels, dedicated to Saint Guidon, who for that region is special patron of horses, cattle, and agriculture, particularly of horses. On Monday after Easter or Monday after Pentecost there is a procession of horses around the church. Little medals bearing the image of Saint Guidon are hung about the horses' necks, and their heads are decorated with paper banners also bearing pictures of the saint.

How prehistoric man solved the engineering problems connected with the transportation and erection of megalithic monuments is not definitely known. Some of the stones employed are of enormous size. A block weighing 40,000 kilograms (44 short tons) forming part of a dolmen at La Perotte (Charente) is thought to have been transported some 30 kilometers (18.8 miles). There are conceivable primitive ways by which transportation for relatively short distances might have been accomplished, one of these being illustrated by Choisy (Fig. 309). To place on end a great menhir involves another set of problems. The giant menhir at Locmariaquer in Morbihan, known locally as Men-er-Hroeck (*pierre de la fée*), now fallen and broken, has a total length of 20.5 meters (67.3 feet) and an estimated weight of over 300,000 kilograms (330 short tons). This enormous monolith was not only transported a kilometer (⅝ mile), but was also lifted to a vertical position. Four of the five pieces of this menhir lie where it fell at some unknown date (Fig. 310).

*Dolmens.*—Nearly five thousand dolmens still exist in France. Of these some 205 have already been set aside as national monuments. A study of the geographic distribution of the dolmens in France reveals the fact that they abound in some regions and are rare or lacking in others. At least five of the departments have none; seven have only one each; while the department of Aveyron has a total of 487. There are two great dolmenic areas in France: (1) the southern, comprising the departments of Aveyron, Ardèche, Gard, Lot, and Lozère; and (2) Brittany, especially Morbihan and Finistère.

Among French dolmens the so-called *allée couverte* (passage grave) occupies an important place. The name is well chosen since the entrance or antechamber is often several times as long as the chamber to which it leads. A notable example of the passage grave is that of Gavr'inis (Goat Island) in Morbihan. The dolmen is 12.5 meters (41 feet) long by 1.4 meters (4.6 feet) wide, and ends in a chamber nearly square, the height of which is 1.8 meters (5.9 feet). A single great flagstone 4 meters by 3 meters (13.1 by 9.8 feet) covers the chamber (Fig. 311). All the stones, covering as well as supporting, are of granite except two which are of quartz. The walls and ceiling of the dolmen are covered with a strange

series of engravings. According to Eugene Stockis, these decorative motives find their replica in palm and fingerprints. With the exception of the ax symbol, they are enlarged reproductions of cutaneous patterns of the human hand. The passage grave is covered by a tumulus having a mean diameter of some 55 to 60 meters

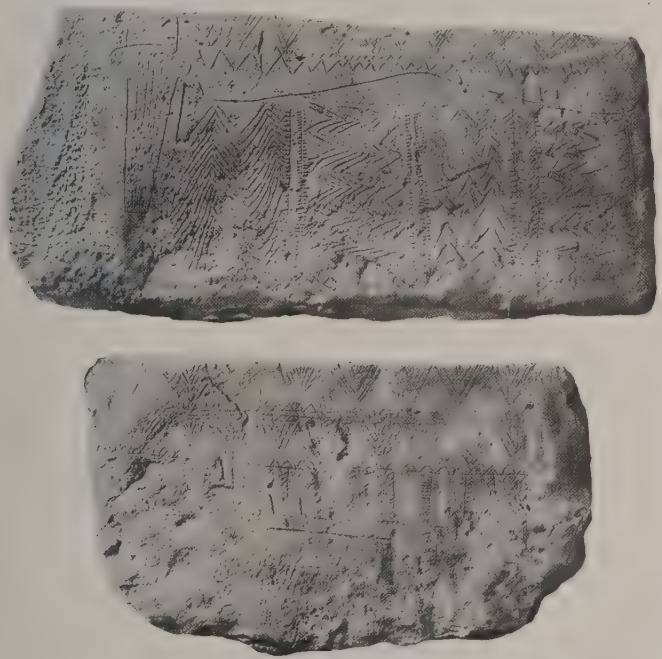

FIG. 312. ENGRAVED STONES FROM THE DOLMEN NEAR GÖHLITSCH, SAXONY.

On each stone there is carved the representation of an ax. Photograph from the Landesanstalt Museum für Vorgeschichte, Halle.

(180.6 to 197 feet). The monument within was discovered in 1832. It had been entered at some unknown prior date, however, and robbed of all portable archeologic contents. The dolmen of Gavr'inis is comparable in some respects with the dolmen under a tumulus near Göhlitsch, district of Merseburg (Saxony), which dates from the middle of the Neolithic Period; two of the engraved stones from Göhlitsch, are reproduced in Figure 312.

FIG. 313. THE DOLMEN OF MANÉ-LUD AT LOCMARIAQUER, MORBIHAN, FRANCE.

Another dolmen of the passage-grave type is that of Mané-Lud at Locmariaquer. The tumulus of Mané-Lud, some 80 meters (262.7 feet) long and 5.5 meters (18.1 feet) high, covers at its western end a passage grave and at the opposite end a sort of cromlech or circle of small menhirs hidden beneath the tumulus. Each menhir supported the skull of a horse. At the center of the cromlech, a cairn (*galgal*) or mass of stones covered a sepulchral cist containing human bones and stone implements (Fig. 313).

FIG. 314. DOLMEN KNOWN AS THE "TABLE DES MARCHANDS" AT LOCMARIAQUER, MORBIHAN.

Neolithic carving on inner surface of one of the supports is illustrated in Figure 302.

The passage grave of Pierres-Plates at Locmariaquer has a length of 28 meters (91.9 feet) and was originally composed of forty-eight supporting, and twenty covering, or table, stones. The ground plan of this great dolmen resembles a tailless bird in flight, the wings representing two corridors and the head and neck the chamber. The first mention of the monument dates from 1813. From 1814 to 1816 it was badly injured by unscrupulous diggers for treasure. Pottery, stone implements, and human bones were found in the dolmen, but the chief interest attaches to the remarkable sculptured figures on the inner surface of several of the supporting stones. The figures, cut in the rock, belong to a class that

has been called scutiform (see Fig. 303). No other dolmen has furnished these designs in such variety.

One of the best known dolmens of Brittany is the Table des Marchands at Locmariaquer, explored as early as 1811 (Fig. 314). The inner surface of one of the supports of the table is covered with incised designs in shape not unlike the boomerang. The tumulus that once covered this dolmen has completely disappeared. Another

FIG. 315. THE DOLMEN OF KERVERESSE AT LOCMARIAQUER, MORBIHAN.

notable dolmen in Morbihan near Carnac is known as Kerveresse (Fig. 315).

The largest dolmenic tumulus in Brittany is in Morbihan—that known as Mont Saint-Michel. The length is 115 meters (377.6 feet) and the breadth 58 meters (190.4 feet). On its summit is a chapel where once stood a Roman temple. The exploration of the central dolmenic crypt, begun in 1862, resulted in the finding of numerous polished stone implements, beads, pendants, etc., one of the finest specimens being a jade ax 40 centimeters (15.7 inches) long. Recent excavations of the tumulus have brought to light nineteen small coffer-like sepultures and three dolmens.

Two other tumuli dispute first place in point of size with Mont

Saint-Michel. Mané-er-Hroeck at Locmariaquer is an oval monticule 100 meters (328.3 feet) long by 60 meters (196.8 feet) wide and rising to a height of 10 meters (32.8 feet). The central funerary chamber, found to be intact in 1863, contained a splendid ax of jadeite resting on a jadeite ring. Other objects found included a cache of 101 axes of jadeite and fibrolite, also potsherds, charcoal, flint, and three other stone axes. The specimens may be seen in the museum at Vannes. One of the supporting stones of the dolmen near the entrance bears a pattern of sinuous incised lines. The other great tumulus, known as Tumiac, is in the commune of Arzon (Morbihan).

One of the most imposing dolmens of western France is that of Bagneux at Saumur (Maine-et-Loir). The ground plan is quadrilateral; the dimensions are: length 20 meters (65.7 feet); breadth about 7 meters (23 feet); and height 3 meters (9.8 feet) to the top of the three table stones. The fourteen flagstones comprising this monument are in fact megaliths, the largest one measuring 7.5 meters (24.6 feet) long by 7 meters (23 feet) in width. This colossal dolmenic chamber is said once to have had a corridor built of smaller flagstones and may hence be classed as a passage grave. It was presumably emptied of its contents at an early date, as the explorations of 1775 were without positive results.

The Bronze Age dolmens of Brittany are distinguished from those of the Neolithic Period by the difference in method of construction. They are no longer composed wholly of megaliths; the walls consist of dry masonry, stone on stone, while the covering may be either flagstones, as in the Neolithic Period, or a false vaulting built of smaller units.

There are many dolmens in the valleys of the Seine and Oise. The characteristic type is a subterranean gallery consisting of an antechamber separated from a long chamber by an upright flagstone. This partition is sometimes perforated (Fig. 266) as at Trie-Château (Oise) and Dampont and La Justice (Seine-et-Oise). The perforated partition recurs in about one-third of the dolmens of the two departments mentioned. Similar perforations connecting the chamber with the antechamber are reported from various countries, including England, Belgium, Sweden, Germany, Thrace, Caucasus, Syria, Palestine, and India.

A monument of unusual type for France is the great tumulus of La Hogue at Fonteney-le-Marmion (Calvados), explored in 1830. The tumulus, composed of calcareous stones, has a diameter of 42 meters (137.9 feet) and covers about a dozen dolmens, each with its corridor. The walls of both chamber and corridor are built of dry masonry, stone on stone. The corridors were covered by flagstones in the usual manner, while the chambers were provided with a false vaulting composed of many units. Stone implements, potsherds, and human skeletal remains were found in the various chambers.

Dolmens are especially numerous in southern France but these are not so imposing as are those of Brittany. The chamber is generally rectangular and bounded by four stones, two large and two small, one of the latter serving as doorway. The flagstone covering the chamber is frequently quite large. The contents of these dolmens do not date wholly from the Neolithic Period; they represent rather an early phase of the Bronze Age usually referred to as the Age of Copper or Eneolithic.

In Provence there are four passage graves that may well be considered as intermediate between the dolmen and the artificial cave. These, located in the commune of Fontvieille, are known as the Grottes des Fées, de Bounias, de la Source, and du Castellet.

The Grotte des Fées is the largest, with a length of 24.25 meters (79.6 feet) and a breadth averaging some 3 meters (9.8 feet). It is dug in the limestone and is reached by descending ten steps cut in the rock. Two lateral chambers near the base of the stairway complete the cruciform plan. The main chamber, or nave, is covered by a series of flagstones, dolmen fashion, once hidden by a layer of stone rubbish. The chamber was emptied at some unknown date and is known to have been in its present condition since 1779.

The other three artificial caves do not seem to have possessed the lateral chambers. The Grotte du Castellet, explored in 1876, yielded several dozen flint arrowheads, one of which was found lodged in a human vertebra, polished stone axes, bone points, beads, pendants, 114 rondelles made of a species of turquoise (*callais*), a gold bead, and pottery, including a caliciform goblet. Caliciform vases of Brittany belong to the Neolithic Period,

whereas in southern France they represent the first epoch of the Bronze Age proper.

On the arid plateau of Ger are many tumuli belonging to two entirely different epochs, all alike, however, as to outward aspect. A relatively smaller number contain dolmens of the passage-grave type in which are found late Neolithic inhumations and industrial remains. The others belong to the Iron Age (Hallstatt Epoch), as indicated by the objects of bronze and iron and the cinerary urns and burnt human bones found therein.

Even a hasty survey of the megalithic monuments of southern France would be incomplete without some mention of the dolmen known locally as the Payre de la Fade (*Pierre de la Fée*), situated 1 kilometer (⅝ mile) northwest of Draguignan (Var). The bare covering, or table, stone is 6 meters (19.7 feet) in length.

One should not lose sight of the fact that when the walls of a dolmen are built of large, crude stones set on end, there will remain large chinks between adjoining stones. In dolmens still intact these chinks are invariably filled in with small stones. Fillings of this sort have disappeared from dolmens that have lost their tumuli.

*Geographic Distribution of Dolmens.*—Dolmens are common to Asia, Africa, and Europe. They are found as far east as India, in Syria, Crimea, the Caucasus, and Bulgaria; Sweden, Norway, Denmark, northern Germany, Holland, Belgium, the British Isles, France, Spain, and Portugal; Algeria, Tunis, Tripoli, Morocco, Egypt, and the Soudan. They are wanting in Hungary, Bohemia, and southern Germany, also in Greece. The only dolmens reported from Italy are in the province of Otranto. Many dolmens have been reported from the region east of the River Jordan. At Roknia in Algeria there is a vast necropolis comprising some three thousand dolmenic tombs. Cornwall, Wales, and the neighboring islands form the principal English dolmenic zone. One of the most imposing dolmens of the British Isles is that of New Grange, near Drogheda, County Meath, Ireland.

Megalithic monuments are widely distributed over the Iberian peninsula. They bear a general family resemblance to those of France. Worthy of special mention are three giant dolmens near Antequera (Malaga). The Cueva de Menga has an oval ground plan with an inner length of 25.4 meters (83.4 feet), a maximum

breadth of 6.1 meters (20 feet), and a height of some 3.0 meters (9.8 feet). The inner faces of the large supporting stones were worked to a comparatively plane surface. Near the center are three additional supporting stones made necessary by the great width of the structure. The chamber is covered by four great flagstones. The gallery, or antechamber, is short but wide. Gomez-Moreno states that rude stone implements were found within the chamber. The entire structure is covered by a tumulus. The Cueva del Romeral and the Cueva de Viera, both of the passage-grave type, are built of smaller stones. In each the stones used are worked to a flat surface and are smaller than those used at the Cueva de Menga.

Dolmens with false vaulting or corbelling are by no means infrequent in Spain. These belong to a later period than those with roofing stones large enough to span the distance between opposite supporting stones. Obermaier has recently worked out a relative chronology for the megalithic monuments of Spain. He would place the simple dolmens at the end of the Neolithic Period, also those with small or rudimentary antechamber or corridor. To the initial phase of the Age of Copper belong the passage graves and the giant chambers, the latter continuing throughout the age. Stone cists made their appearance during the early Bronze Age. In all countries dolmens serve a common purpose, that of sepulture.

*Origin of Dolmens.*—The question of the origin of dolmens brings up the broader one of multiple origin of a given idea as opposed to transmission of the idea by contact. The geographic distribution of dolmens does not hold the key to a solution of this problem, although it is not inconsistent with the idea of transmission by contact.

There is a school whose creed is that the East is *par excellence* the birthplace of great ideas, which, as they mature, travel westward as inevitably as do the trade winds of the sea. There is another school which disputes the theory that all light comes from the Orient. Obviously much is yet to be learned concerning megalithic monuments in general, and dolmens in particular, before a final categorical answer can be formulated.

There is already considerable evidence in support of the theory that the dolmen cult spread slowly westward and northward from

some center not far from the eastern end of the Mediterranean basin. Recently Elliot Smith presented the claims of Egypt as the probable center. He believes that the dolmens are degraded *mastabas,* the earliest form of Egyptian tomb. If this be true, one must think of the dolmen, not as the whole of the *mastaba,* but as its core, overgrown and stripped of nonessentials. The parts that are constantly represented in every dolmen correspond to the *serdab* (Arabic word meaning statue chamber) and the burial chamber, often merged into one. The stone with a large hole, found in dolmens so widely separated as western Europe, the Caucasus, and India, is thought by Elliot Smith to be "a striking witness to the reality of the *serdab*-conception in the dolmen," and the dolmen itself to be the crude, overgrown copy of that part of the *mastaba* known as the *serdab,* which was supposed to be the dwelling of the deceased.

*Menhirs, Cromlechs, and Alinements.*—Hardly less important than the dolmens are the long megaliths employed either singly or in series. The purposes which monuments of these classes served remain problematical. Apparently they are in no way connected with burials. It is highly probable that a single menhir served one purpose, while a group of menhirs forming a circle might have served wholly another purpose, and an alinement still another. The menhir might well have served as a cenotaph even in Neolithic times, as it is known to have done in subsequent periods. It might also mark an important event of some other nature. In commemoration of his dream Jacob erected a stone to mark the spot, and Samuel set up a stone after his victory over the Philistines. After the spread of Christianity in Gaul certain menhirs were converted into Christian monuments and remain so to this day.

It is apparent that most of the great menhirs were erected by the same Neolithic race which built the megalithic dolmens. They are often found in close proximity to, or in association with, such dolmens. The giant menhir of Locmariaquer stood nearly twice the height of its two nearest rivals in France, Plesidy (Côtes-du-Nord) and Plouarzel (Finistère), each slightly more than 11 meters (36.1 feet) long. There are more than a dozen other menhirs in France varying in height from 8 to 9 meters (26.3 to 29.5 feet). The vast majority are from 1 to 5 meters (3.3 to 16.4 feet) high.

Menhirs, like the megaliths forming dolmens, are for the most part unworked stones (Frontispiece). Seldom does the shaping process play more than an insignificant rôle. At Quiberon a large menhir nearly 5 meters (16.4 feet) high dominates a field of smaller menhirs. The large menhir, originally suggestive of a human effigy, bears marks intended to heighten the human-effigy effect. Some authors claim to find phallic forms in certain menhirs; others, notably Déchelette, deny such claims.

It is a fact worthy of note that a few menhirs and dolmens in Brittany were planted so near the sea that they are now partially submerged at high tide, an indication that there has been a change in the land level of the region since the period of megalithic construction.

The distribution of menhirs, cromlechs, and alinements does not coincide with that of dolmens, although all are seen perhaps to best advantage in Brittany. For the whole of France, A. de Mortillet's list, completed in 1901, comprised a total of 6,192 menhirs, including cromlechs and alinements. Every department in France is represented in the list, but over half the total number are found in Morbihan.

A series of menhirs forming a circular or rectangular enclosure constitute a cromlech. This term does not apply, however, to the stones surrounding a tumulus, which are generally nondescript and placed in contact, forming a sort of barricade. The veritable cromlech may stand alone; sometimes it is associated with an alinement, as is the case at Ménec, Kerlescan, Crozon, Lestridiou, etc., in Brittany.

A typical example of the cromlech is Er-Lanic on a small island of the same name off the Morbihan coast. It is a double cromlech, one circle of menhirs tangent to another circle. At present it is partly covered by the sea even at low tide; hence it must have been built at a time when the land level was higher than it is now. Within the limits of the two circles Closmadeuc found many polished stone axes, crude black pottery, milling stones, etc.

Fergusson listed as many as two hundred stone circles in the British Isles, but he seems to have included stone circles surrounding tumuli, which do not belong in the category of cromlechs. Two of the greatest megalithic monuments of England, namely, Avebury

and Stonehenge, may be considered as belonging to the cromlech class.

Avebury, in Wiltshire, the largest of British megalithic monuments, has all the elements that go to make up a great complex of cromlechs. The principal monument at Avebury consists of an almost circular embankment of earth, with an average diameter of about 366 meters (1,200 feet), with a ditch inside. Near the inner margin of the ditch stood a circle of stones apparently about one hundred in number originally. Inside this large stone circle were two other double stone circles, each double circle averaging more than 91 meters (300 feet) in diameter. In the center of the northern double circle was a structure consisting of three upright stones and a capstone, in other words, a simple dolmen. At the center of the southern double circle there was a single menhir, according to Stukeley and Colt Hoare. The stones employed for all the circles are the so-called *sarsen*[5] stones native to the local downs. None of the Avebury stones bears marks of the chisel.

From the outer embankment an avenue lined by stones, known as Kennet avenue, extended southeastwardly in a straight line for a distance of some 1,308 meters (1,430 yards). The Avebury group comprises not only the Avebury circle and Kennet avenue, but also Silbury Hill, about 1,610 meters (1 mile) due south of Avebury, and perhaps the double oval on Hakpen Hill, known as Haca's Pen. Silbury Hill evidently dates from the same period as the great circle and Kennet avenue; Haca's Pen apparently belongs to a later epoch, its stones being much smaller and the plan different. Silbury Hill is flat-topped and nearly round, with a basal diameter of 168 meters (552 feet) and a height of 40 meters (130 feet). Excavations at Silbury Hill have apparently yielded no archeological results.

Stonehenge, also in Wiltshire, is a worthy rival of Avebury and is perhaps even better known (Figs. 316 and 317). They have certain characters in common, although Stonehenge obviously belongs to a later epoch than Avebury. A comprehensive bibliography of the two monuments is said to cover 160 pages.

The enclosing circular embankment and ditch at Stonehenge,

[5] A silicious sandstone found as a deposit in the valleys between Salisbury and Swindon.

which opened out at one point into an avenue flanked on each side by a ditch and bank, had a diameter of about 111.3 meters (365 feet). The stone-circle complex in the center had a diameter of about 29.9 meters (98 feet). As restored, it consists of an outer circle of great stones, an inner semicircle of five great trilithons, a circle of small stones between the outer circle and the semicircle of trilithons, and a semicircle of small stones within the limits

FIG. 316. ENSEMBLE VIEW OF STONEHENGE, WILTSHIRE, ENGLAND.

The stone circle complex has a diameter of about 29.9 meters (98 feet). It consisted originally of an outer circle of great stones, an inner semicircle of five great trilithons, a circle of small stones between the outer circle and inner semicircle, a semicircle of small stones within the limits bounded by the trilithons, and a large "Altar Stone" within the semicircle of small stones. This great monument was erected during the late Neolithic or early Bronze Age, about 2100 B.C.

bounded by the trilithons. Within the smaller semicircle there is a large stone, called the "Altar Stone," which might have had relation with two other isolated stones, one of which is just inside the embankment and the other, known as the "Friar's Heel," outside. A straight line drawn through these three stones is said to point approximately in the direction of the rising sun at the summer solstice.

The outer circle is supposed to have consisted originally of thirty stones spaced about equally and connected by a continuous

stone architrave. Fergusson states that only twenty-six of the upright stones can be identified, and only six of the stones composing the architrave are still *in situ*. Of the five great trilithons, the two upright members of the central one are 6.6 meters (21.6 feet) in height. The other four are not quite so tall.

All the stones composing the outer circle and the trilithons are the same stone that was used at Avebury, where however, it was

FIG. 317. DETAIL VIEW OF STONEHENGE FROM THE "ALTAR STONE."

The view was taken in the direction of the " Friar's Heel " which can be seen outside the stone circle complex and between the two supporting stones of the central trilithon.

used in the rough. At Stonehenge it was hewn into a shape fairly uniform throughout the series. In addition, each upright has at the top a tenon which fits into the mortised stones of the architrave.

All the small stones within the limits of the great circle are cut from a volcanic rock, a species of bluestone, not native to the locality. In view of their relatively small dimensions, they might easily have been transported a considerable distance. Even the transport of the great sarsens was not a very serious matter, since they were found near-by and could have been assembled by means of rollers and ropes. Stonehenge is referred to the epoch of transition between the Neolithic Period and the Bronze Age.

The problem as to what purpose was served by the imposing monuments of Avebury and of Stonehenge on Salisbury Plain has never been satisfactorily solved. Schuchhardt sees striking analogies between certain features of Stonehenge and the oldest Greek culture: the Altar Stone is a *stela,* to be thought of as originally the throne of the soul. Stonehenge, however, was not a temple, nor is there any astronomical significance in its orientation. Moreover, it is to be dated by the contents of the near-by mounds composed largely of by-products of the construction period; they contain culture remains that can be referred to the Bronze Age (Epoch II of Montelius, *ca.* 2100–1850 B.C.).

Stone insists that the two circles at Stonehenge, one of sarsens and one of bluestone, are of the same age. The sarsens were erected first, and the erection of the bluestones was undertaken immediately afterward by the same builders. If the structure marks the direction of the mid-summer sunrise at the time it was built, the date for the building "was probably not earlier than about 2040 B.C., and not later than about 1640 B.C." It will thus be seen that Stone's estimate does not differ materially from that of Schuchhardt.

Other stone circles in the British Isles, which belong in the same general class as Avebury, include Arbor Low in the parish of Bakewell (Derbyshire), Blisland in Cornwall, and Stennis and Brogar in the Orkneys. Arbor Low is now a national monument; it is situated on a long ridge about 366 meters (1,200 feet) above sea level and commands an extensive view toward Buxton and Bakewell. The embankment, or rampart, is on the outside; both it and the ditch are broken at the north and south by an opening or causeway. The forty-six stones inside the circular rampart and ditch (forty-two form a circle, at the center of which the other four stones are grouped) are all at present recumbent with one exception. The longest stone has a length of 4.32 meters (14.2 feet), the largest is 3.96 meters (13 feet) in length. A human skeleton was found near the four stones at the center. Excavations under the direction of H. St. George Gray yielded very little in the way of relics: chipped stone implements including a flint dagger of late Neolithic type, flint flakes, flint hammerstones, a few earthenware vessels, but no metal of any sort. The conclusion

is that Arbor Low was constructed during the latter part of the Neolithic Period, or at the very latest, during the epoch of transition from the Neolithic to the Bronze Age.

An alinement is a series of menhirs ranged in rows. The best known monuments of this class are the alinements of Carnac in Brittany. With two interruptions, they extend in an east-west direction a distance of some 3 kilometers (2 miles). The three groups bear the names of the three adjoining villages, Ménec, Kermario, and Kerlescan.

The alinement of Ménec (see Fig. 308) consists of eleven rows of menhirs and a cromlech, making a grand total of 1,169 standing stones. The menhirs forming the group vary in height from less than 1 meter to 4 meters (3 to 13 feet). The 982 menhirs forming the alinement of Kermario are ranged in ten rows. The alinement of Kerlescan is built of 540 menhirs in thirteen rows, to which is attached a cromlech of thirty-nine menhirs enclosing a quadrangular space.

To the north of Carnac, in the commune of Erdeven, there is another important alinement composed of 1,129 menhirs ranged in ten rows over a distance of more than 2 kilometers (1.25 miles). One of the menhirs is pitted with cup-shaped figures. There are still other alinements in Morbihan, including Sainte-Barbe and Saint-Pierre-Quiberon, each with a cromlech attached; Vieux-Moulin, near the railway station of Plouharnel; and several now in ruins.

Finistère also has its share of alinements: Lestridiou, with a cromlech at one extremity; Toulinguet, in the commune of Camaret; and Crozon, on the peninsula of the same name. According to Déchelette, alinements properly so-called are peculiar to Brittany.

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# CHAPTER XII

## THE STONE AGE CULTURE COMPLEX[1]

The evolution of culture has its parallel in organic evolution, and, like the latter, its pathway is strewn with extinct forms. Of the two, cultural evolution is subject to more rapid changes, its chief basis being human inventiveness. One invention leads to others by a system of budding and branching, so that a single invention may give rise to a whole cluster of related activities forming what might be called a culture-complex unit. The oldest clusters of human activities of which we have definite knowledge are the lithic and fire complexes; the lithic complex was superseded in part and supplemented by the use of such organic materials as bone, ivory, and reindeer horn, which characterized the game-animal complex.

The advent of the Neolithic Period witnessed a rapid development of new units or clusters of human activities, chief among them being the ceramic, textile, mining, building, domestication, transportation, barter, and wheel complexes, all of which are closely interrelated. The domestic horse became a pack and draft animal and the center of the horse complex, which has persisted even to our day. As long as man thought in terms of the horse, its place was secure and the automobile was impossible. With the passing of the horse there will go a multitude of accessories. This is only one illustration of the inception, growth, decay, and at least partial dissolution of a single cell in the culture complex. On the other hand, the wheel, originally closely associated with and dependent upon the horse (or draft-animal) complex and largely developed during the Age of Metals, by changing hosts has, with

[1] Certain elements of the prehistoric culture complex, especially when they have no particular classificatory value, are treated to best advantage if followed vertically upward through succeeding epochs; this method will be followed in the present chapter.

fire, become the chief binding element in the culture complex of the historic period.

The use of fire, the wheel, and the use of metals remain among the most important of man's acquisitions. When, where, and by whom did each first come into use? What ethnic type was responsible for each? These are questions the answers to which might form the basis for a discussion of some of the most interesting chapters bearing on human origins.

Man is the most cosmopolitan of all animals. He can and does live in every clime and at practically all altitudes. His control over environment, aided by superior intellectual endowments and gained by long ages of struggle, has contributed to his conquest of space. During the Neolithic Period transportation facilities were very much increased through the use of pack animals and other load-saving devices. The discovery of the wheel and its application to transportation purposes was a still greater step in advance. With the appearance of the wheel the necessity for something more than a trail made itself felt.

Man also became a navigator, by simple means at first and for short distances; then by complex means and for greater distances. Facilities on land and sea served to whet his appetite for adventure and conquest. Coincident with improved and increased travel facilities arose conditions favoring a *mélange* of races unknown to Paleolithic times. The result was that even as early as the Bronze Age, European man was well on the way to his present high degree of hybridization.

## The Taming of Fire

By the taming of fire we have been able "to smooth down the rough creation which Nature flung to us." This great elemental force has not yet been wholly subdued. When and how man first gained the initial step in its control is lost in the obscurity of a remote past.

The degree of civilization of any epoch, people, or group of peoples is measured by ability to utilize energy for human advancement or needs. Energy is of two kinds, internal and external or free. Internal energy is that of the human body or machine, and

its basis is food. External energy is that outside the human body, and its basis is fuel. Man has been able to tap the great storehouse of external energy. Through his internal energy and that acquired from external sources, he has been able to overcome the opposing energy of his natural environment. The difference between these opposing forces is the gauge of civilization.

Fire, the most potent external force ever acquired by man, occurs in nature; primeval man saw and felt it before he had any knowledge of how to produce it. The terrors of a forest fire were shared alike by man and beast; such a fire might arise from the eruption of a volcano, a bolt of lightning, or the rubbing together of two branches kept in motion by the wind. In the wake of a forest fire man might have come upon the roasted carcass of a game animal. The heat of the fire rendered the flesh more tender, palatable, and agreeable to the sense of smell. Moreover, the roasting process was found to be a preservative. Heat penetrates food and kills bacteria; furthermore, the traces of creosote and formaldehyde in smoke and the complete evaporation of moisture render it less liable to infection.

The heat and light given off by fire came to be associated in the mind of primitive man with the heat and light of the sun, and perhaps in a remote way with the heat of his own body and the phenomenon of life. Man observed that fire has its limitations —must have combustibles to feed upon, is encouraged by winds, and has natural and insuperable barriers such as water, rock, bare soil, etc. Man also learned that when near to being extinguished, fire may be revived by the application of fresh fuel; he found too that by means of a brand it was possible to carry fire to the fuel, and no doubt this was done when the reverse process entailed the greater amount of labor. By reviving embers from a natural fire and by transplanting fire through the medium of brands, man found a means of roasting game killed in the hunt. It is thus probable that the utilization of fires started through purely natural processes, but kept alive and controlled for a time at least by artificial processes, long antedated a knowledge of how to kindle fires by artificial means.

Through fire the seasons were controlled, also day and night; by control of its heat, winter could be turned into summer, and

its light converted night into day. The light of the fire at night was also an element of safety against wild beasts. Fire not only softened the rigors of winter; it also rendered possible the habitation of regions where body heat and clothing alone would not suffice. The camp fire became the center about which the sum of human interests revolved; it served as a magnet to draw individuals together and offered environmental conditions which invited relaxation, reflection, and exchange of ideas. It was the savior of the newly born infant and the chief comforter of old age. Through its beneficent influence the span of life has gradually lengthened and the sum total of human lives increased. In short, fire, and all that it stands for, has been the chief binding element of the human culture complex, the torch by means of which man has been able to explore two worlds, the organic and the inorganic.

It may be something more than a coincidence that fire can be struck with flint, out of which the first man-made tools were fashioned. If flint had failed to possess this combination of qualities, the first steps toward the taming of fire might have been delayed for untold ages. One of the principal reasons for the extremely slow progress in the evolution of culture during the Lower Paleolithic Period may be due to man's inability to kindle a fire at will.

Traces of fire, especially in the form of burnt flints, have been found in connection with habitation levels even antedating the Lower Paleolithic, for example, in the Pliocene of East Anglia; they have also been reported in Pre-Chellean horizons, but no well defined hearths have been recorded from deposits earlier than the Middle Paleolithic (Mousterian). The relative frequency with which charcoal and other evidences of localized fire maintenance are encountered in the Mousterian horizons points to at least a beginning toward the control of fire. The first step, however, did not include ability to produce fire at will. Although well acquainted with the use of fire, the Tasmanians, for example, knew no way of kindling it; they took great pains, however, to keep it always burning, and if by chance it became extinguished, new fire was borrowed from a neighboring tribe. Similar practices were no doubt in vogue among early Paleolithic peoples.

The first indubitable evidence of producing fire by artificial

FIG. 318. PYRITES AND STRIKE-A-LIGHTS DATING FROM THE MAGDALENIAN EPOCH TO THE IRON AGE.

1, Nodule of pyrites with a groove produced by a flint strike-a-light, from the cave of Chaleux at Furfooz, Belgium, Magdalenian Epoch; 2, flint strike-a-light from the Moselle Valley; 3, flint strike-a-light from central Jutland, Denmark; 4, flint strike-a-light made from a fragment of a dagger, central Jutland; 5, flint strike-a-light with polished margins from a giant dolmen at Lundforlund, Zealand, Neolithic Period; 6, flint strike-a-light from a Neolithic burial at Hoegild, Jutland; 7, flint strike-a-light from Saint-Symphorien near Mons, Belgium; 8, flint strike-a-light firmly attached to its nodule of pyrites by means of rust, from a Bronze Age burial at Hendriksholm, Zealand; 9, small flint dagger which has also served as a strike-a-light, from a Bronze Age tomb at Vesterland, Schleswig; 10, flint chisel which has served as a strike-a-light (marked by traces of pyrites), from a Bronze Age burial at Mogenstrup, Jutland; 11, flint strike-a-light altered by the action of fire, from a Bronze Age incineration burial, Jutland; 12, flint strike-a-light from a Bronze Age sepulchral urn from Vium, Jutland; 13, strike-a-light of red quartzite with polished surface and a peripheral groove for suspension, from the peat bog of Soesum, Zealand; 14, strike-a-light of quartzite (right) and wooden tinder box (left), the two held together by means of a hinged mounting of bronze from the peat bog of Kragehul (Fünen) Denmark; 15, nodule of pyrites showing marks of wear against a strike-a-light, from the peat bog of Thorsbjerg, Schleswig; 16, strike-a-light of iron from a Viking burial, Gotland, Sweden. Scale, *ca.* ½. After Sarauw.

means is afforded by relics from the Upper Paleolithic Period; these relics include scarified lumps of pyrites and flints suitable for "strike-a-lights" (Fig. 318). One of the earliest discoveries of

this sort was a deeply scored nodule of pyrites found by Dupont in Magdalenian deposits of the Chaleux cave at Furfooz, Belgium. A block of pyrites with the end worn was found about the same time by Lartet and Christy in the cave of Les Eyzies (Dordogne). Flint scratchers and slug-shaped implements suitable for use in striking a fire from pyrites are of common occurrence in deposits of Aurignacian, Solutrean, and Magdalenian age. Another line of evidence bearing directly on the ability of the Upper Paleolithic races to produce fire at will is afforded by the mural art of dark caverns and the existence of stone lamps, by the light of which the artists executed engravings and frescoes.

This is hardly the place to discuss at length the primitive methods still employed to produce fire in addition to the one by percussion (flint and pyrites) already mentioned. A common method is by friction, either by to-and-fro or by rotary motion. An effective primitive fire-making apparatus consists of two bamboo sticks. A longitudinal groove is cut from the nether stick, and tinder is placed under the groove; the upper stick is passed back and forth, saw fashion, across the groove until the tinder is ignited. At a fire-making contest between primitive contestants from various parts of the world, planned by Mills and Starr at the St. Louis Exposition of 1904, the winner was a Negrito, using bamboo sticks—time, fifty-eight seconds.

The uses of fire were perfected and multiplied during the Neolithic Period; it was made not only to fell a tree, but also to shape a dugout. Methods of curing meats and of cooking were perfected, and among coincident acquisitions must have been hot water, for both cooking and cleansing purposes. Fire tended both directly and indirectly to encourage community life and give permanency to the home. Without it the manufacture of pottery would have been impossible, and the use of pottery is an effective check to nomadism.

That fire is the leaven chiefly responsible for the growth of the culture complex is perhaps seen to best advantage in the transition from the Stone Age to the Age of Metals. Without it the transition could never have been effected, and the world would still be running on a Stone Age basis, for the simple reason that fire is essential to the reduction of metallic ores.

## Hunting

Hunting is as old as humanity; when the human precursor traded the arboreal for the terrestrial domain, he became a hunter by necessity as well as by choice. As a hunting domain, the terrestrial far surpasses in richness and variety the arboreal; for among its denizens are the herbivorous animals, and man has always had a predilection for herbivorous game.

Man has conquered the terrestrial domain because of his inventiveness, his abilty to harness external forces. This aided him in combat with wild beasts as well as in killing or capturing game. Paleolithic man made use of the wooden club, the throwing stick, the bola, flint knife, javelin, dart thrower, and harpoon (Fig. 319). He was more dependent on the chase than his successors were, since his chief food supply was gained by hunting and fishing.

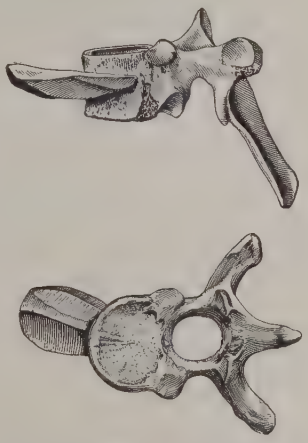

Fig. 319. Human dorsal vertebra pierced by a quartzite point, from the cave of Montfort, Ariège, France.

The upper figure is the view from the left side, and the lower the view from beneath. This discovery shows that Paleolithic man used the javelin as a weapon as well as for hunting. Scale, ½. Redrawn from Count Begouen.

Although not so dependent upon fish and game, the Neolithic races found them a very convenient supplement to the products of agriculture. They continued to use in modified form some of the weapons employed by the Paleolithic hunter, adding to their stock the bow and arrow and the hafted ax. Among the Stone Age contrivances use was made of the trap and pit. With the advent of the Bronze Age a marked improvement in weapons for the chase was witnessed.

According to de Mortillet, sixty-six species of mammals were hunted in Paleolithic times, whereas the number during the Neolithic Period and the Bronze Age was only about half as great.

At the Neolithic pile village of Robenhausen, Rütimeyer found the ratio of wild to domesticated animals to be 35 to 49. In the Bronze Age bog station of Laibach, remains of wild animals predominated in the ratio of 295 to 264.

FIG. 320. NEOLITHIC BONE FLUTE FROM THE PILE VILLAGE OF CONCISE, VAUD, SWITZERLAND.

Photograph by Tschumi.

Although not so dependent upon hunting as their forebears were, the Neolithic and later races had a most useful aid in the domestic dog, which no doubt accounts, in part at least, for the favor with which hunting continued to be looked upon (Fig. 320).

## FISHING

Man first began to fish, not for the pleasure of it, but for the purpose of increasing his food supply. The origin of fishing dates back to the Paleolithic Period, since, as we have shown, in an inventory of cave art one finds engravings of the fish. Fish bones, composed of a relatively great amount of animal matter and very little mineral matter, decay easily; nevertheless, they do occur even in Paleolithic deposits. Bones of the Spanish mackerel, eel, salmon, and trout have been reported from the Grimaldi caves near Mentone. For France and Spain the list includes carp, eel, flounder, pike, plaice, salmon, and trout. Shellfish were also prized in prehistoric times. Before the close of the Paleolithic Period, shells began to play an important rôle as an ornament.

In the Neolithic kitchen middens *Gadus oeglefinus* and *Pleuronectes limanda* are the species most abundant; bones of the herring and eel also occur. The chief food of the Neolithic coast dwellers, however, was shellfish, preference being shown for the oyster; *Cardium edule, Mytilus edulis,* and *Littorina littorea,* in the order given, were much in favor.

At first, simple means of catching sufficed. The most primitive

known fishhook dates from the Paleolithic Period. It is a straight sliver of bone or reindeer horn, some 3 or 4 centimeters (1.2 to 1.6 inches) long and pointed at both ends, the cord being attached to the center (Fig. 96). Many fishhooks of this type were found at the station of Bruniquel, near Montauban (Tarn-et-Garonne). The caves and rock shelters of the Dordogne have also yielded fishhooks, not only of this primitive type, but also of more perfected types—barbed points of bone and reindeer horn, veritable harpoons, etc. (Figs. 98–100).

Thanks to lake dwellings, we have numerous examples of objects used in fishing by the Neolithic peoples. There is the well developed fishhook, recurved and sharp, with a groove near the base for attaching the cord, found at Moosseedorf (Berne), one of the very earliest Neolithic stations; it is made of the tusk of a wild boar. Straight bone points sharpened at each end and with a depression at the center for attaching the cord recur in Neolithic stations; good examples from Wangen, Lake Constance, are reported by Keller. The harpoon of staghorn is also found in the lake dwellings, for example, at Moosseedorf and at Saint-Aubin, Lake Neuchâtel.

The inhabitants of lake villages possessed even more efficient apparatus for catching fish. Fragments of fish nets of linen, each with its uniform mesh, have been preserved. Nets presuppose floats and weights, and these have likewise been found.

Shells, an important by-product of prehistoric fishing, were used in industry and as an ornament. Twenty shells of *Cypraea* were deposited with the Magdalenian skeleton found at Laugerie-Basse —four on the frontal, two on each upper arm bone, four at each knee, and two at each foot. They had been brought from the Mediterranean and were perforated for suspension. Sixteen different species of shells were employed in industry at Laugerie-Basse during the Upper Paleolithic Period. Mother-of-pearl, pearl, and coral were highly prized in prehistoric times.

### Navigation

The log was the prototype of the first canoe. The first step in the evolution of the canoe would be to point the ends of the log.

This primitive form of solid canoe has persisted down to modern times in but one part of the world, namely, on the coast of Australia. It required no small degree of ingenuity to take the next step by making a dugout. The primitive navigator probably thought only of providing a means to keep his load dry and his legs out of the water; in reality he builded better than he knew, for in providing a dry place for himself and his belongings, he not only lightened the weight of the vessel, but also increased its buoyancy. It is not known where this invention took place.

We are not quite so much in the dark as to the original homes of the two other kinds of primitive vessels, the reed float and the raft made buoyant by means of inflated skins. The former seems to have originated on the Nile, and the latter on the Euphrates.

There is evidence that the Paleolithic peoples had discovered the art of navigation, since the Azilians navigated the 8 kilometers (5 miles) of sea between the Island of Oronsay and the Scottish mainland. The oldest known boats are the Neolithic dugouts, carved from the trunk of a tree, usually oak. The shaping of this primitive vessel was done by means of stone implements aided by the use of fire.

In 1865 Raffaello Foresi discovered on the Island of Elba a Neolithic workshop where nine-tenths of the materials used were varieties of flint and quartz common to the mainland but not to the island—conclusive proof of commercial intercourse by means of water transportation between the Neolithic dwellers on the island and those on the continent. On the Island of Pianosa, halfway between Corsica and the Italian coast, Foresi found obsidian nuclei which had been brought from the mainland, since obsidian is foreign to Pianosa.

Some of the Swiss lake dwellings belong wholly to the Neolithic Period. When completed, these villages were connected with the shore by means of a bridge; but in the construction of the village, in the driving of the piles and the building of the platforms, boats were necessary. In some rare cases the villages were never connected with the shore, as, for example, those in Lake Varese, northern Italy; boats were thus indispensable at all times.

Examples of these primitive boats have been recovered from various Swiss lake dwellings. Ferdinand Keller reproduces ex-

amples from Robenhausen and the lake of Bienne (Fig. 321). Robenhausen is a purely Neolithic station, so that the dugout found there dates from that period. Of the many boats from the lake of Bienne mentioned by Desor, one found near Saint-Pierre Island was still laden with stones intended as packing for the piles. It is 15 meters (49.2 feet) long, nearly 1.5 meters (4.9 feet) wide, and made from the trunk of a giant oak; it dates from the Neo-

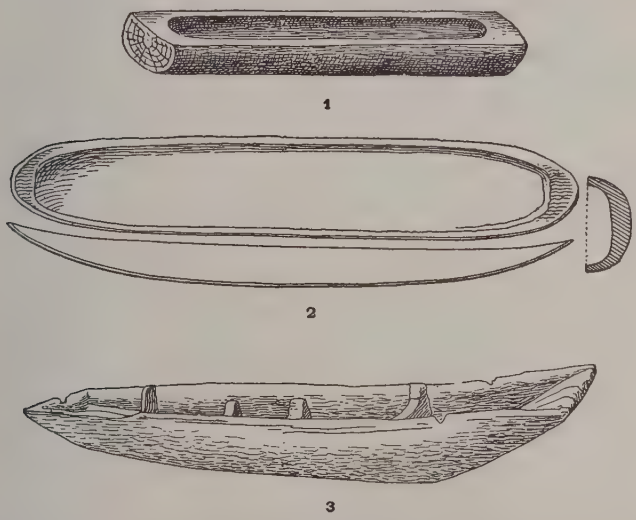


FIG. 321. NEOLITHIC DUGOUTS, THE EARLIEST BOATS KNOWN TO HAVE BEEN USED BY MAN.

No. 1, from Möringen, Lake of Bienne; No. 2, from Robenhausen; No. 3, from Saint-Aubin-en-Charollais. After Keller and Bonnet.

lithic Period. There are transverse foot rests at intervals and two seats near the preserved end. The other end was sawed off in order to make the boat fit into the basement of the museum at Bienne.

Boats, some of Neolithic age and others dating from the Bronze and Iron Ages, have been found in other parts of Europe. A number have come to light in Scandinavia. Many of the Scandinavian pictographs belonging to the Bronze Age represent boats longer and more formidable than those of the earlier period (Fig. 322)

Buchannan states that no less than seventeen canoes had been found in the estuarine silt of the Clyde at Glasgow during the eighty years prior to 1855. Others have been found there since that time. They lay at depths of from 1.5 to 5.8 meters (5 to 19 feet). Nearly every one of these vessels was hollowed out of a single oak stem by means of stone tools aided by the action of fire. In one of the boats was a beautifully polished celt of greenstone; in the bottom of another, a cork plug, testifying to traffic

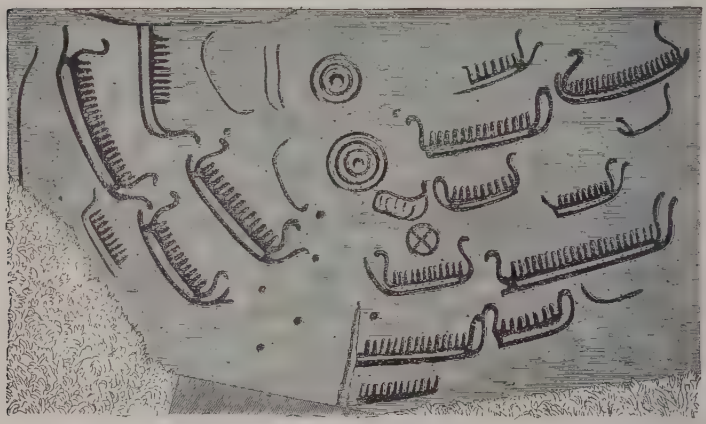

FIG. 322. BRONZE AGE PICTOGRAPHS REPRESENTING SOLAR-BARKS FROM BORGE, NORWAY.

The sun was supposed to make his return journey by night on the water and therefore to have required a boat. The sun is represented in various ways—dots, dotted circles, and wheels. After Montelius.

with Spain or some other distant country. A few of the boats were evidently shaped by the use of metal tools. Two of them which were of plank construction presumably belong to the Iron Age. One of these was 5.5 meters (18 feet) long, with a prow resembling the beak of an antique galley. The planks were fastened to the ribs in part by oaken pins and in part by metal nails, squarish in section, which had entirely disappeared.

In the museum of the Royal Irish Academy are several ancient boats. One of these, 7 meters (23 feet) long, is formed from the trunk of an oak tree; in its bottom were found a wooden vessel

for removing water and two poles which were probably used in pushing the boat from shore. In carving out the interior, three ribs had been left in relief to give strength and to provide footrests for the boatmen.

Perhaps the finest dugout yet recovered in France is from the Lake of Chalain (Jura). Associated with it were numerous implements of stone, bone, and staghorn. It is of oak and measures 9.35 meters (30.7 feet) in length. The prow lines and the stern are not unlike those of modern times. The hole in the bottom filled by an oak plug was probably intended for a mast. This fine specimen is preserved in the museum at Lons-le-Saunier. While the dugout was the only type of boat known in Neolithic times, it persisted for a considerable period during the Age of Metals.

A Viking ship was found in a mound at Oseberg in 1903. It is beautifully carved and nearly as large as the Gokstad ship described below, but not so well preserved. The contents included a loom with tapestry, luxuriously ornamented sleds, and a carriage of fine workmanship, but no weapons.

A large boat in an excellent state of preservation, dating from about the fifth century A.D., was found in 1863 at Nydam, northeast of Flensburg in the Duchy of Schleswig, by the Danish archeologist Engelhardt. This vessel, which had no mast and was evidently propelled by means of oars, is preserved in the Kiel Museum.

This, the second ancient boat found at Nydam, is of oak and clinker-built; the planks were held together by iron bolts at intervals of about 14 centimeters (5.5 inches), and the calking was done with a woolen stuff and pitch. The planks were cut from the finest of timber, the bottom plank being 14.2 meters (48 feet 6 inches) long and of one piece. The boat is 23.48 meters (77 feet) long from stem to stern and proportionately rather broad in the middle, namely, 3.3 meters (10 feet 10 inches); it carried twenty-eight oars. The rudder was found at the side of the boat, about 3 meters (10 feet) distant from the stem; it is 2.9 meters (9 feet 7 inches) long and is pierced midway by a hole through which a rope may have been passed for the purpose of tying it to the side of the boat. Under the hole there is a wooden cushion to protect the rudder from injury by knocking against the side of

the boat; this is the most ancient form of rudder known. The boat had apparently been sunk intentionally, as indicated by the holes which Engelhardt found cut in the plank below the water line.

A vessel said to date from about 300 B.C. was found in 1922 in the Hjortspring bog (Schleswig) and is now preserved at the National Museum, Copenhagen. Shields, spears, swords, etc., were found in the vessel, which was built of elm and propelled by ten oars. The total length is 13 meters (42.5 feet), and the width 2 meters (6.5 feet).

The Viking period was notable for the progress made in navigation. According to ancient manuscripts, the custom of ship burial prevailed; the existence of this custom has been confirmed by archeological researches. In 1867 a grand tumulus was opened at Tune, near Frederikstad in southern Norway. It contained a ship, inside of which was a man with his arms and his two horses. Thanks to the clay covering, the greater part the ship was almost intact. It belongs to a later date than the ship from Nydam. Although the two are of similar construction, there is one marked difference—the ship from Tune had a mast. Its length of keel was over 12 meters (39.4 feet).

Of even greater importance was the ship burial uncovered at Gokstad, near Sandefjord, also in southern Norway but on the opposite (west) side of Christiania Fjord (Fig. 323). This ship, like the one from Tune, was also covered by a clay deposit and hence well preserved; both are in the collections of the University of Christiania. From bow to stern the ship measures nearly 24 meters (78.8 feet), with a maximum breadth of more than 5 meters (16.4 feet). It is of oak, clinker-built; the boards are secured by means of iron nails, and the seams are calked with oakum. There was a single mast and sixteen pairs of oars; the latter vary in length, those from amidship being the longer. They were plied through holes bored in the third stroke from the top; when the oars were unshipped, these holes could be stopped by means of sliding covers which prevented the sea from entering. There is no trace of thwarts or seats for the oarsmen. As shown in the illustration, the ship was decorated with thirty-two shields on each side. In a funeral chamber just back of the mast, the chieftain was inhumed with his arms and with the remains of twelve horses, six

dogs, and a peacock by his side. In the ship were four supports for a tent cloth, as well as bits of the cloth and attaching cords. The rudder was hung a little forward of the sternpost on the right-hand side, as was usual in vessels of the Viking period and, indeed, down to the fourteenth century: hence the word "starboard," or steering board, to indicate the right side of a ship, a term still common to all English and Teutonic languages (the term "larboard" is now practically supplanted by "port," thus avoiding the

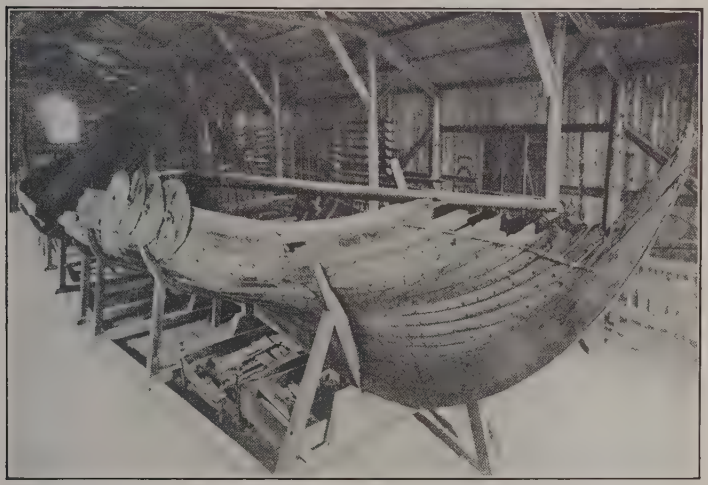

FIG. 323. VIKING SHIP FROM GOKSTAD, NEAR SANDEFJORD, NORWAY.

This ship, nearly 24 meters (about 78 feet) long dates from the late Iron Age. It was found in 1880 and is now preserved at the University of Christiania.

use of two like-sounding terms). The Gokstad ship dates from the late Iron Age, about 800 A.D.

According to Elliot Smith, the main lines in the history of naval architecture were laid down in Egypt about 5,000 years ago, and the Egyptians had been building large wooden seagoing ships for two millennia before the time of Pliny. The earliest known representation of a seagoing ship was found in the tomb of the Egyptian king Sahure of the Fifth Dynasty (2600 B.C.); it already displayed "most of the essential features which persisted for many centuries in seagoing vessels," the distinctive curve of the hull,

the high stern, and the representation of eyes upon the bow all being present. It had a two-limbed mast. It is pointed out that this ladderlike construction, which was in vogue in Egypt 5,000 years ago and which was superseded prior to 2000 B.C., is still being used in Burma and the Celebes; moreover, the Burmese boats retain the same distinctive form of hull, high stern, sails, and rigging as the ship of Sahure.

The earliest rudder was a "simple paddle held on the quarter, or a paddle-shaped rudder slung at the head on a stout upright, and held at the neck by a rattan lashing," a type still in use on Malay dugouts, according to Warington Smyth. It was used by the first navigators of the Mediterranean and with slight modifications remained in use in western Europe down to medieval times. In Siam the king's state barge is still steered by two men with long steering paddles in precisely the same way that the Egyptian boats of the Third Dynasty were steered.

Warington Smyth is also authority for the statement that the idea of using the steering oar in the median position at the stern can be traced back to the Twelfth Dynasty; but the modification of its shape and method of attachment (slung upon the sternpost by pentle and gudgeon (as in use to-day dates only from the beginning of the fourteenth century, and hence took thirty-four centuries (after the Twelfth Dynasty) to be accomplished.

There are historical records to prove that in the Third Dynasty (*ca.* 2900 B.C.) Egyptian ships were trading in the Mediterranean as far as Syria and in the Red Sea as far as the Bab-el-Mandeb. There is reason to believe with Elliot Smith that these were not the only Egyptian maritime expeditions. The Field Museum, Chicago, possesses a mortuary boat of Sesostris III, dating from about 1850 B.C., which is made of cedar of Lebanon and is 9.15 meters (30 feet) long, 2.44 meters (8 feet) wide, and 1.22 meters (4 feet) deep.

In predynastic Egypt the bark dedicated to the dead played an important rôle in the art of the time. J. de Morgan reproduces examples from Diospolis parva, Nagada, El Amrah, and Negadah, also from rock paintings at Chatt-el-Regal (Upper Egypt). These are represented as having many oars, including a steering oar for the rudder.

## The Wheel

Means of transport are at the base of all civilization. They have been developed enormously during the past dozen decades, so much so that one is apt to overlook their important bearing on human welfare and to forget, or remain ignorant of, their humble beginnings.

The ancient hunter who succeeded in killing a large animal had either to leave the greater part of the carcass where the beast fell or else drag it over the uneven surface of the earth. Dragging would injure the skin, a useful part of the booty, and recourse was had to the limb of a tree, the branches of which would afford the needed protection. From this simple drag device developed the sled, particularly efficient during the winter months in temperate and cold climates.

The sled was widely used at an early date even in such countries as Egypt, and its efficiency was multiplied by pouring a lubricating liquid in front of the moving runners. In Egypt we have linguistic proof, as pointed out by Forestier, that the sled antedated the wheel. Among the ancient hieroglyphs there is no ideographic symbol signifying wheel or wagon. One does find, however, the ideograph for sled, which is even used with two differing pronunciations depending on the words into the composition of which it enters.

Increase in the efficiency of the power employed can be had by the use of rolling pins or poles under the sled runners. This method is known to have been employed by the ancient Assyrians at an early date. Two difficulties beset the use of rolling pins: the process is slow, and the direction of the movement is difficult to control. For this reason the rolling pin has not played an important part in the evolution of traction.

Primitive man did not have to be a keen observer to perceive the possibility of taking advantage of the form of a cylindrical or rotund body as an aid to the process of transportation. The discovery of a means of applying the motive force to such a body was by no means so simple. It led first to the preparation of terminal axle attachments in line with the axis of rotation, thus producing the roller which is still in use, and finally to the nonrotating

axletree supported by the wheel. Aranzadi describes carts still in use among the Basques that are built so as easily to break the connection between wheels and axle and the carrying frame.

The first wheels were evidently sections from tree trunks. The wheel rotating on its axis is said to have been in use by the Chinese as early as 2697 B.C. For obvious reasons, the section of a tree trunk soon gave place to the wheel composed of more than one piece of wood. The next step was to lighten the wheel by cutting away as much of the inner portion as possible. A wheel composed of three pieces of wood with the inner portion cut away was found in a peat bog at Mercurago, associated with tools and utensils of Gallic origin (Bronze Age) and dating from about 1500 B.C. A plaster cast of this wheel is preserved in the museum at Saint-Germain.

A later and better method of making the wheel light was the use of spokes, but this change could hardly have taken place prior to the use of the metal tire. The combination of the metal tire and spokes likewise added much to the strength and life of the wheel. Until this combination took place, transportation by means of wheeled vehicles must have been limited indeed.

Both horse and war chariot are said to have been unknown in Egypt prior to the invasion of the Nile Delta by the Hycksos about 2300 B.C. Subsequent to this date one finds numerous representations of the spoked wheel and chariot, also of the horse. The Metropolitan Museum, New York, possesses a wheel 89 centimeters (2 feet 11 inches) in diameter with six spokes, found in a mummy pit at Dashour.

The wheel complex is so largely and inextricably interwoven into the fabric of modern civilization that one is unthinkable without the other. Take away fire and the wheel and the world would suddenly revert to a sub-Neolithic level. By the aid of the wheel the evolution of civilization has gone on with a rapidity which makes all anterior progress seem slow indeed.

Three things were necessary for the growth of the wheel complex—motive power, roadway, and metal. The primeval motive power was man, but to man power there was soon added the dog, horse, ox, etc.; the invention of the wheel and the domestication of animals were approximately contemporaneous and were no

doubt mutually interdependent—the existence of one encouraged that of the other. The wheel is a Neolithic invention, but its use was extremely limited until after the discovery of metals. The efficiency of the wheel is likewise contingent upon fixed lines of travel, and these could hardly have been anything but very primitive until improvements were called forth through progress in vehicular construction. The evolution of wheeled vehicles and improved travel routes are means to an end, that end being the creation of national and international commercial and intellectual contact.

### The Domestication of Animals and Plants

Of some seventy species of animals, the remains of which occur in Neolithic lake dwellings, at least six were domesticated: the dog, horse, ox, sheep, goat, and pig. By far the most numerous are the remains of the ox and the red deer (a nondomesticated species), which equal those of all the other species combined. According to Pittard and Reverdin, the first five domesticated animals to appear in Neolithic pile-village stations of Lake Neuchâtel are the ox, hog, dog, sheep, and goat, the first three being the most numerous. All five are found in the lowest archeological level at Auvernier; they seem to have arrived, therefore, at the same time. The horse was neither domesticated nor hunted as a game animal on the shores of Lake Neuchâtel.

The Neolithic pile dwellers had a decided preference for beef and pork; they also preferred adult animals, with the exception of the hog, which was often eaten very young. The calf and the kid were never eaten until partly grown.

Whence came the origin of the domestication of animals? The first domesticated animals in Europe might have been importations. It is not safe, however, to conclude from this that all that followed in Neolithic times were likewise importations. Almost all animals may be tamed, and some may be domesticated. The domestication of animals has had several independent centers of origin—Euro-Asia, Indo-China, Africa, and the New World. Indo-China is to be credited with the chicken, peacock, buffalo, elephant, and zebu. The aboriginal races of the New World had already domesticated

the alpaca, guinea pig, llama, and turkey before the arrival of Columbus. The domestication of the ass and the cat is thought to have taken place in Africa. The Euro-Asiatic field has contributed a large share to the sum total of animal domestication.

*The Dog.*—The dog was the first animal to be domesticated, and for a long time it was the only species in this class; it remains to this day the most completely domesticated of animals. Remains of the domestic dog have been found in practically all Neolithic and Bronze Age deposits of Europe. By the end of the Bronze Age one finds several races developed, the most marked being a grayhound type in Austria and a mastiff type in Savoy. The grayhound type of dog is frequently represented in the art of early Egypt—a large grayhound with straight ears, consecrated to Anubis, which has its counterpart in *Canis simensis,* the present wild dog of Abyssinia and parts of the African interior. Aristotle (350 B.C.) mentions seven races of dogs. The bulldog is represented on a bronze situla from the Certosa at Bologna (proto- or pre-Etruscan).

*The Cat.*—No trace of the domestic cat has been found in the Neolithic of Europe; its earliest occurrence is in Egypt, where it is figured on the monuments and is found mummified. At each overflow of the Nile there was a pest of rodents taking refuge in the human habitations. The cat was found to be the best means of combating this recurring nuisance, hence its domestication and the part it played in the beliefs and practices of the people. Mummified cats fill whole cemeteries at Bubastis. The domestic cat crosses easily with two wild species of Africa, both of which were mummified in great numbers by the Egyptians.

*The Hog.*—Remains of the wild boar are found in the Paleolithic deposits of Europe. The domestic hog, *Sus scrofa palustris,* occurs abundantly in Neolithic and Bronze Age stations. According to Mariette, the Egyptians of the Fifth Dynasty (2750–2625 B.C.) had the domestic hog but did not possess the buffalo, camel, chicken, or sheep.

*The Horse.*—The remains of the horse are abundant in Paleolithic deposits, and it plays a more important part in cave art than any other animal. Its bones are encountered also in Neolithic stations, but there is no convincing evidence of its having been

domesticated. With the Bronze Age, however, the presence of the bridle bit and harness trappings no longer leave room for doubt. At Bologna and Este horses are often represented on bronze vases as held by a halter or hitched to vehicles, but more often mounted by soldiers. In Hallstatt (first epoch of the Iron Age) tumuli of France, Germany, and Switzerland, bones of the horse are often found with those of his master. The horse is not represented in Egyptian art until the beginning of the Eighteenth Dynasty (1350 B.C.). The earliest Egyptian text making mention of the chariot dates from about the same time. According to de Mortillet, the domestication of the horse first took place in Turkestan.

*The Ox.*—The domestic ox came from the wild ox of the Paleolithic Period. Remains of the ox are abundant in Neolithic stations, forming an appreciable part of the kitchen refuse. The Neolithic pile village of Concise has furnished two species of the domestic ox, one large, the other small and similar to the present Black Forest breed of cattle. Two species of ox, one large and the other small, are also found in the Bronze Age terremare of Italy. Montelius describes a Bronze Age rock engraving from Bohuslän (Sweden) which represents two oxen pulling a four-wheeled vehicle. The domestic ox is figured on early Egyptian monuments, and the worship of the bull Apis dates from as early as the Fifth Dynasty. Milk and its products were made use of even in Neolithic times, as is witnessed by the churn dasher found at Robenhausen. Special bowls, pierced for use in the manufacture of curd, and cheese moulds date from the Bronze Age.

*The Sheep.*—Bones of the sheep are found in both Neolithic and Bronze Age lake dwellings of the Alps and in the terremare of Italy. In Egypt the sheep was the symbol of Ammon. Sheep shears constructed on a plan similar to those of to-day date from the Iron Age.

*Domestic Fowl.*—The domestic goose dates back to the earliest Egyptian dynasties. In a tomb of the Fifth Dynasty, Mariette found four varieties of the goose. The wild goose of Egypt is easily domesticated. Homer speaks of but two domestic birds, the goose and the pigeon. The domestication of the duck came later than that of the goose, and yet it played a very important rôle in art. The pigeon, like the goose, was domesticated at an early period

in Egypt, the chicken not until later. Domestication was extended to include certain invertebrates, such as the honeybee and the oyster.

The lake villages of Switzerland afford abundant evidence of the extent to which animals were domesticated during the Neolithic Period. The list includes the dog (*Canis familiaris palustris*) found at Lüscherz, Schafis (Chavannes), and Lattrigen; three kinds of ox: (1) *Bos taurus primigenius* from Font and Sutz; (2) *Bos taurus brachyceros*, Lattrigen, Schafis, and Vinelz; and (3) a hornless variety, *Bos taurus akeratos*, from Sutz; two varieties of pig: (1) *Sus scrofa palustris*, Lattrigen, Moosseedorf and Wauwil; (2) *Sus scrofa domesticus;* the goat (*Capra hircus rütimeyeri*), Sutz and Vinelz; and the sheep (*Ovis aries palustris*), Font and Schafis.

The Bronze Age in Switzerland witnessed the introduction of several new species or varieties of domesticated animals and at least one new genus (*Equus*). The new elements include two new varieties of dog: (1) *Canis matris optimæ*, from Möringen and Greing; (2) a wolfhound (*Canis familiaris inostranzewi*), occurring at Font in deposits which seem to represent the transition from the Neolithic to the Bronze Age; a new variety of goat (*Capra hircus kelleri*); a variety of merino-like sheep (*Ovis aries studeri*), Lüscherz; and the horse (*Equus caballus orientalis*), Lüscherz.

The Iron Age in Switzerland seems to have added nothing new to the list of domesticated animals except two varieties of dog: (1) a deerhound (*Canis familiaris leineri*), from Constance and (2) (*Canis familiaris intermedius*), from Greing.

*Plants.*—Much of our knowledge concerning the domestication of plants we owe to pile dwellings, since they offer the conditions necessary for the preservation of substances that otherwise would soon fall into decay. Thanks to the researches of Heer, Neuweiler, and others, the number of known prehistoric species of plants exceeds 200, of which about 170 are reported from Switzerland Among the most important in the list are wheat, oats, rye, barley, flax, grape, strawberry, apple, pear, etc.

Many of these were domesticated as early as the Neolithic Period. Wheat was the most common cereal; three varieties of wheat and two of barley were cultivated. The principal Neolithic

textile[2] was flax, not the modern species, but one with narrow leaves *Linum angustifolium*, which still occurs spontaneously in Mediterranean countries. Hemp was unknown.

Neolithic milling stones are abundant, not only in pile dwelling stations but also in village sites on land. They consist of a flat stone of compact texture, generally grit, and a smaller hand stone, both of which are worn by usage. Grinding the grain seems to have been the work of women, since in the great Neolithic necropolis near Worms the milling stones are associated with female burials. Loaves of bread, made evidently without the use of yeast, have been found in Neolithic lake dwellings.

In Switzerland, during the Neolithic Period, plants were cultivated for food, for the fiber, and, in at least one case, for the production of an opiate. Two species of barley have been recorded, one (*Hordeum vulgare*) from Robenhausen and the other (*H. distichon*) from Wangen. Three species of wheat occur: *Triticum dicoccum* at Greifensee, Robenhausen, and Wangen; *T. monococcum* at Robenhausen; and *T. vulgare* at Robenhausen and Wangen. Two kinds of millet have been reported: *Panicum miliaceum* from Wangen and *Setaria italica* from Robenhausen. The pea (*Pisum sativum*) has been found at Robenhausen and Steckborn; and the lentil (*Ervum lens*) at Lüscherz and St. Blaise. Flax (*Linum sp.*) must have been quite widely cultivated for its fiber, since it has been reported from a number of lake villages including Moosseedorf, Robenhausen, Steckborn, and Wangen. The poppy (*Papaver somniferum*) has been found at Moosseedorf, Robenhausen, and Steckborn and is to be numbered among the plants cultivated by the Neolithic lake dwellers of Switzerland, who also domesticated the apple (*Pyrus malus*).

In addition to the foregoing, there are several plants that might have been cultivated, although the evidence is not sufficient to remove them from the doubtful class. They are: (1) the pigweed (*Chenopodium album*) from Robenhausen, Steckborn, and Wangen; (2) the parsnip (*Pastinaca sativa*) from Moosseedorf and Robenhausen; (3) the carrot (*Daucus carota*) from Roben-

[2] It may be that wool was also employed in the textile industry, since the sheep is counted among the animals domesticated as early as Neolithic times.

hausen (?); (4) the walnut (*Juglans regia*) from Wangen and Bleiche-Arbon; and (5) the grape (*Vitis vinifera*) from St. Blaise.

The Neolithic population still drew heavily on the resources of wild plant life both for food and fiber, and in two instances for coloring matter. The following list is taken from C. Schröter:

Oak (*Quercus robur*), Robenhausen, Wangen, and many other stations.

Beechnut (*Fagus silvatica*), Robenhausen, Steckborn, and Wangen.

Hazelnut (*Corylus avellana*), Robenhausen, etc., very plentiful.

Waternut (*Trapa natans*), Moosseedorf and Robenhausen.

Mountain ash (*Sorbus aucuparia*), Moosseedorf and Robenhausen.

Crab apple (*Pyrus malus*), Robenhausen, Steckborn, and Wangen.

Wild pear (*Pyrus communis*), Robenhausen and Wangen.

Strawberry (*Fragaria vesca*), Robenhausen, Steckborn, and Wangen.

Dog rose (*Rosa canina*), Robenhausen, Steckborn, and Wangen.

Raspberry (*Rubus idaeus*), Moosseedorf, Robenhausen, and Wangen.

Blackberry (*Rubus fruticosus*), Moosseedorf, Robenhausen, and Wangen.

Sweet cherry (*Prunus avium*), Moosseedorf, Robenhausen, and Steckborn.

Damson plum (*Prunus insititia*), Robenhausen and Steckborn.

Plum (*Prunus domestica*), Schweizersbild.

Blackthorn (*Prunus spinosa*), Robenhausen, Steckborn, and Wangen.

Bird cherry (*Prunus padus*), Robenhausen, Steckborn, and Wangen.

Mahaleb cherry (*Prunus mahaleb*), Robenhausen and Steckborn.

Whortleberry (*Vaccinium myrtillus*), Robenhausen.

Elderberry (*Sambucus nigra*), Robenhausen, Steckborn, and Wangen.

Dwarf elder or danewort (*Sambucus ebulus*), Moosseedorf, Robenhausen, and Steckborn.

Knot weed (*Polygonum convolvulus*), Robenhausen and Steckborn.

Linden (*Tilia platyphyllos*), Robenhausen and St. Blaise; (*T. cordata*), Robenhausen.

Yellow weed (*Reseda luteola*), Robenhausen.

Schröter also gives a list of trees, the wood of which was utilized by the Neolithic peoples of Switzerland:

Yew (*Taxus baccata*), Ergolzwil and Robenhausen.
Pine (*Picea excelsa*), Robenhausen (pile).
Silver fir (*Abies alba*), Burgaeschii (plentiful), Ergolzwil, Robenhausen.
Scotch fir (*Pinus silvestris*), Robenhausen (rare).
Willow (*Salix*), Niederwil.
Poplar (*Populus*), Niederwil.
Hornbeam (*Carpinus betulus*), Burgaeschii and Schötz.
Alder (*Alnus sp.*), Burgaeschii and Ergolzwil.
Beech (*Fagus silvatica*), Robenhausen and Steckborn.
Oak (*Quercus sp.*), Robenhausen, Schötz, and Steckborn.
Elm (*Ulmus sp.*), Greing.
Maple (*Acer sp.*), Burgaeschii and Robenhausen.
Ash (*Frasinus excelsior*), Fällanden, and Heimenlachen.

The Bronze Age races of Switzerland added only a few species to the list of plants already cultivated in Neolithic times. A species of oats (*Avena sativa*) has been found at Montelier and Petersinsel; spelt (*Triticum spelta*), at Möringen and Petersinsel; and the bean (*Vicia faba*), at Corcelettes, Montelier, and Petersinsel. Two other plants, both found at Möringen, were probably cultivated: charlock (*Sinapis arvensis*) and a cabbage (*Brassica sp.*). One finds evidence at Vinelz that use was made of one new wild plant, the chestnut (*Castanea sativa*).

At least two cultivated plants were added to the list known in Switzerland during the Iron Age: the onion (*Allium cepa*) and the turnip (*Brassica rapa*).

*Agriculture.*—The domestication of plants goes hand in hand with cultivation of the soil. The first tool for cultivating the soil was the digging stick; it was supplemented later by spades and hoes, and last of all by the plow. Hahn has pointed out that the digging stick is an extension of, and substitute for, the finger; the spade and hoe are extensions of the hand; and the plow bears a like relationship to the foot. He believed that plows were at first drawn by women; later the ox and the cow were employed.

A round-headed race living south and east of the Caspian Sea

were among the first to give adequate attention to the subject of agriculture. This fact enabled them to spread slowly over Europe from 4000 to 2000 B.C.

That maize had been cultivated in the New World long before its discovery by Columbus is proved by its differentiation into varieties and by the extended area over which it was found—from the southern extremity of Chile to the 50th parallel of north latitude, and from New England to Arizona. Describing its cultivation among the Hurons in 1623–26, Sagard says that they dug a round place at every two feet or less and planted nine or ten grains of corn which had been previously selected, culled, and soaked in water for several days. The same spots for planting were used year after year, the earth being turned over by means of a wooden spade. The Virginia Indians are said to have enriched their fields with shells and fish; the Indians of the arid Southwest had instituted successful irrigation projects. In addition to maize, various other plants, including beans, gourds, squashes, pumpkins, sweet potatoes, tobacco, and the sunflower, were cultivated in the New World prior to its discovery by white men.

## Commerce

Civilization is measured by the radius of the circle of man's requirements. Commerce is the medium by which the radius is lengthened, and commerce depends upon media of exchange and transportation facilities. Paleolithic man lived in a trackless wilderness; his circle of requirements was practically nil, being met by the immediate locality in which he happened to be. His needs were measured by his ability to meet them; he adapted himself to his environment and was no doubt as well satisfied with his lot as any of his successors have been with theirs.

Neolithic man discovered and learned how to make use of hitherto unknown natural resources. He tapped virgin beds of flint, and flint of the best quality soon came to be the vogue, was sought after, and became an article of commerce. He learned that it was possible to make a species of stone from clay by tempering and firing it. The newly discovered ceramic industry, together with the taming of animals and plants, made sedentary life pos-

sible. Thus was ushered in the change whereby man no longer had to go after the thing he wanted; on the contrary, it was made to come to him. With the habitual transport of materials, routes both by land and water were established.

The exploitation of flint mines on a large scale during the Neolithic Period presupposes a considerable amount of traffic in flint. Some idea of the extent of Neolithic commerce may be had by tracing the distribution of the products of a given mine. Grand-Pressigny (Indre-et-Loire) flint affords a good example because of its distinguishing color (beeswax). De Saint-Venant, who made a special study of the subject, found Pressigny flints as far away from the center of dispersal as Brittany, northern France, Belgium, Italy, and western Switzerland.

The geographic distribution of obsidian is likewise easily traced because of its color and its association with volcanic regions; it is confined in Europe to limited areas in France (Cantal), Bohemia, Hungary, the Greek archipelago, and Italy (vicinity of Naples). Neolithic traffic in obsidian is traceable in Italy and the Greek archipelago.

The frequency with which one encounters ornaments and implements of jade or nephrite in Neolithic stations of Europe can be explained only on the ground of its being an object of barter. Heinrich Fischer was obviously wrong in supposing all jade and jade ornaments found in Europe to be of Asiatic origin. Although the occurrence of jade in nature is much more limited geographically than the Neolithic distribution of jade objects, G. F. Kunz in 1899 found at Jordansmühl (Silesia) a single mass of jade large enough to have met the needs of Neolithic man over the whole of Europe. Jade in Europe can thus be accounted for without making a draft on Asia, but commerce is the logical explanation for its Neolithic dissemination.

A very important line of evidence bearing on prehistoric commercial relations is furnished by amber. During the Neolithic Period, amber continued to be rare except in the Baltic region. It has not been reported from the kitchen middens, but northern sepultures dating from the later epochs of the Neolithic have yielded many amulets and ornaments of amber. Symbolic axes and hammers of amber have been found in various northern stations (Born-

holm, Vester-Götland, and Bohuslän). The first Bronze Age merchants who carried metal wares into the north brought back amber, which thereafter became an important article of commerce throughout Europe. The introduction of bronze into Scandinavia and the general dissemination of amber throughout Europe took place from 1200 to 1000 B.C.

## The Healing Art

Disease is almost as old as life itself. Caries, for example, is common among fossil vertebrates: according to Renault, it is found in Permian fishes that lived twenty million years ago. Pyorrhea alveolaris, fracture, callus, and parasitism also date from the Paleozoic Period. Lesions are found on the bones of dinosaurs, turtles, crocodiles and other reptiles of the Mesozoic Period similar to those produced in modern times by periostitis, necrosis, arthritis, and osteoma. Fossil animal remains from the Tertiary deposits also afford evidence of the existence of numerous diseases.

Our knowledge of prehistoric surgery is limited to operations that affected the bony tissue. The osseous remains of Paleolithic man thus far brought to light are relatively few in number, hence the small chance of discovering traces of Paleolithic surgical operations even if these existed. On the other hand, there is abundant evidence that Neolithic man practiced surgery with a considerable degree of skill and success.

The only Neolithic surgical operation of which we have definite proof is trepanation. It can be traced without a break from modern surgical practice back at least to early Neolithic times and to a race closely akin to the Paleolithic hunters of western Europe. Its great antiquity is matched also by the boldness which led to its inception. The hardihood of the first attempt could scarcely have found sufficient basis in a knowledge of cephalic anatomy, and yet those who deposited their dead in communal sepultures must have been more or less familiar with the human skull. Given, however, a great emergency, this slight familiarity might have contributed toward a steadiness of nerve not otherwise attainable.

The first cases might well have been victims of accident or violence. This was the view of Prunières, who supposed that once

a depressed fracture had been successfully relieved, a like operation might be tried on those suffering from delirium or convulsions not due to violence but with symptoms similar to those caused by a depressed fracture. In the opinion of Broca, such a view would presuppose physiologic and medical knowledge not within the reach of the Neolithic practitioner, whom he believed to have been inspired by superstition rather than by observation. Two of Broca's reasons for this conclusion were (1) what he believed to be the complete absence of any vestige of ante-mortem fractures about the trepanned areas, and (2) the constant integrity of the forehead, which would not have been respected by fractures. We shall see, however, that in so far as Inca trepanation was concerned, Broca was mistaken on both these points. The number of exceptions to what Broca believed to be the rule would doubtless be larger were it not for the fact that in a majority of traumatic cases the signs of fracture would be entirely removed by the operation.

A point in support of Broca's theory was the presence of cranial-bone amulets in French Neolithic sepultures, especially those of the Lozère and the Marne. Superstition is rooted in the unknown. Mysterious maladies, whose causes were attributed to divine or diabolic influences, are those most likely to give birth to such a practice as trepanation. Among these maladies epilepsy and convulsions of every sort take first rank. The superhuman strength of the patient during an attack was proof of the presence of an imprisoned spirit. Release this spirit and the malady would be cured—hence trepanation.

The Neolithic operator probably did not distinguish between epilepsy and convulsions common to childhood. The failures to cure epileptic cases by means of trepanation would be offset by the cases of childhood convulsions, which would be outgrown. The practice would thus be justified and become fixed. In time special virtues might be attributed to crania that had been trephined. The aperture through which the spirit escaped would come to possess supernatural qualities; from its borders would be (in fact, were) cut bone amulets to be worn by those who would escape similar maladies (Fig. 324). In time, incomplete trepanation, that is, the removal of the external table, might be substituted for the more

serious operation involving the entire thickness of the cranial case.

That flint implements were wholly adequate for the operation was demonstrated by Broca, who by means of a Paleolithic chipped flint from the cave of Cro-Magnon (Dordogne), trephined the skull of a two months' old dog. The operation, which was by the scraping process, lasted about eight minutes; during this time the dura mater was laid bare over an area as large as a twenty-centime piece. Broca was able also to satisfy himself that scraping subjected the outer cerebral membrane to less danger than any other trephining process. The dog did not even have a temperature following the operation, and the wound healed promptly, this

FIG. 324. CRANIAL AMULETS FROM THE NEOLITHIC ARTIFICIAL CAVES OF THE PETIT-MORIN VALLEY, MARNE, FRANCE.

After Déchelette

despite the fact that the flint was of great antiquity and somewhat dulled instead of possessing the keen edge produced by a fresh fracture of freshly quarried flint.

It is not strange that even the best authorities should have confounded, for a time at least, cases of prehistoric trephining with openings that might have been the direct result of wounds or of pathologic conditions. Again, some openings in the cranium are known to be congenital. In the latter category belong the abnormally large parietal foramina and openings due to cerebral hernia, but their position and the nature of their margins make them easily distinguishable from trepanation. Pathologic openings in the skull are produced by intra- or extra-cranial tumors that invade and destroy the bony tissue, and by a disease of the bone itself. The former need not be confused with trepanation because the margins cannot cicatrize. In the latter, although cicatrization is possible, the diseased condition of the bone extends beyond the perforation.

Traumatic openings would be the most difficult of all to distinguish from trepanation, because there might be complete cicatrization of the margins and at the same time complete integrity of the adjoining bony tissue. Hence the appearance of a key specimen was necessary in order that the scientific world might grasp the fact of prehistoric trephining.

It remained for a noted American archeologist, E. G. Squier, to produce the key specimen. In examining the important collection of Señora Zentino of Cuzco, Squier's attention was attracted by a skull from a pre-Columbian Inca cemetery in the Yucay Valley, some 38 kilometers (24 miles) east of Cuzco. This skull was given by his hostess to Squier, who later submitted it to Broca. The latter immediately recognized in the skull a case of trepanation, for the simple reason that the opening could not have been due to any other procedure.

The aperture is rectangular, and it was produced by means of two pairs of parallel incisions, one pair at right angles to the other. Since the incisions extended in all directions beyond the corners of the opening, this method necessitated the removal of relatively much more periosteum than would be required in the more complex circular operations. Curiously enough, Broca failed to profit fully by the lesson of this case from Peru, for it was not until several years later that he recognized the prehistoric examples already found in France as actual cases of trepanation.

Perhaps in no other part of the world was prehistoric trepanation more in vogue than in Peru. The Yale Peruvian Expeditions of 1914 and 1915 gathered from caverns in the highlands northwest of Cuzco a series of human crania and mummies to the number of 298 (fragmentary specimens included). If from this total we eliminate the small fragments and the crania of young children, there remain 250; out of these, forty-six, or eighteen per cent, had undergone at least one trephining operation. But some of the skulls were operated on more than once, in one case five times (Fig. 325); so that the percentage of operations to the total number of skulls would be even greater.

By a study of the position of the fractures and trephining operations, one can make out a good case for the assumption that their high percentage marks a period of warfare among the Incas.

So far as we know, among barbaric as well as civilized races a majority of both sexes are right-handed. In combat, therefore, the left side of the head would be exposed to greater danger than the right. If the fractures and trepanations are found to be prevailingly on the left side, then their position is not fortuitous but controlled rather by the exigencies of combat.

It was thought best to set aside all cases of partial trephining —those that affected the external table only. We first considered

FIG. 325. FRONT AND TOP VIEWS OF A TREPHINED INCA CRANIUM FROM PATALLACTA, HIGHLANDS OF PERU.

This skull (of a male) had been trephined five times and in each case the wound had healed. Photograph by the author.

the cases of fracture not followed by an operation but that were fatal. Of the twenty in this class, eleven had suffered injury to the left side of the head and only three to the right side. The wounds of the remaining six were either on the front or back of the head, and these might have been fortuitous, although they might equally have been due to warfare. But no theory of chance could explain away the great preponderance of injuries to the left side in the first fourteen cases cited. In one of these there was a fracture of the left scapula also.

The second lot consisted of fractures that were not fatal and

that apparently were not followed by an operation. Of the seven skulls in this group, five had been fractured on the left side and only one on the right. In the seventh the wound had been on the front.

In eight cases fractures were followed by operations and death. Of these, six were on the left side and only one on the right. In the two cases where the victim survived both the fracture and the operation, the wound had been inflicted on the left side and on the left rear.

The largest group of all consisted of skulls in which the operation might have removed all traces of an antecedent fracture. In twelve cases out of a total of twenty-one, the operation had been on the left side, in eight on the right side, and in one on the back of the skull. Seventeen out of the twenty-one had survived.

From a study of these various groups it is obvious that, with the possible exception of the last in part, chance had nothing to do with the location of the fracture or operations. On the other hand, a different situation exists in the list of partial operations, that is, where the external table only was removed or where the trouble was superficial. Here all parts of the skull were about equally affected. They represent either accidental wounds or thaumaturgic operations.

In brief, the burial caves in question represent a period of strife in the history of the highlands of Peru, a period which tended to develop the use of surgery. In rare instances the knife was employed to remove diseased bone. In some twenty-eight per cent of the cases the operation was to relieve depressed fractures. As a rule, however, the operation either obliterated all trace of its cause, or else the cause was not of such a nature as to affect the osseous system.

Manouvrier has described an unusual type of Neolithic trepanation in France. The crania bearing marks of the operation are not only from a limited area, but rare also from dolmens belonging to the Neolithic Period. The dolmen La Justice at Epône, near Mantes (Seine-et-Oise) has been known since 1833 but was not opened until 1881. In addition to pottery, stone implements, and ornaments, Perrier du Carne obtained portions of about sixty

skeletons, including twelve crania. Manouvrier observed that three of the female crania were marked by curious and similar mutilations in the region of the vertex. In every case the cicatrice is T-shaped. The antero-posterior branch begins just above the anterior curve of the frontal, extends along the sagittal suture, and terminates near the obelion, where the transverse branch is encountered. The latter descends on either side to a point back of the parietal protuberances. The scars are evidently the result of lesions of the scalp made during life, and deep enough to affect, directly or indirectly, the periosteum.

FIG. 326. NEOLITHIC FEMALE CRANIUM WITH SINCIPITAL CICATRICE, FROM THE DOLMEN OF CONFLANS-SAINTE-HONORINE, SEINE-ET-OISE, FRANCE.

Several examples of sincipital cicatrices in the shape of a T have been found on female crania in France. The purpose of the operations has not been ascertained. Scale, ½. After Manouvrier.

Searching through the Broca collection, Manouvrier found three other examples of the cicatrice in T, and all three on feminine subjects. They came from three dolmens in the neighborhood of the dolmen of Epône, namely, Vauréal and Conflans-Sainte-Honorine (Seine-et-Oise) and Feigneux (Oise). In one of these three cases the cicatrice was very slight; in another the diploë was uncovered by either the wound or the suppuration (Fig. 326).

In every instance the lines forming the T were broken at intervals, giving the appearance of successive operations. The operation on the scalp, however, may have been performed at one time and in a continuous line without affecting the skull at all points. None of the crania presents pathological characters. As to the meaning of these marks, Manouvrier suggested that an explanation might be found in practices connected with religion, war, penal justice, mourning, therapeutics or coiffure.

Another link in the chain of evidence furnished by the dolmens, and connecting the Neolithic treatment of cephalic ailments with

teachings of the Galenic school, is furnished by a skull from the dolmen of Champignolles (Seine-et-Oise). Like all but one or two of the seven or eight previously noted, it is that of a female. The character of the lesions indicate that they were made in early life. In the first place, there is the sincipital T with a medial branch 13 centimeters (5.1 inches) long, not perfectly straight but continuous. It is narrow, and suggests an incision of the periosteum rather than a cauterization. The short transverse groove terminates at either extremity in an oval pit large enough to hold the ball of the thumb. The one on the right actually penetrates the skull, forming a perforation 3 to 4 millimeters in diameter with sharp margins. Near the latter, and in a line with the transverse groove, is an extensive lesion, 6 centimeters (2.4 inches) in diameter, with irregular, oval contour. The central perforation is of the same shape, and fully 3 centimeters (1.2 inches) in diameter. In aspect, whatever the intention of the operator may have been, it is a veritable trepanation. Of the bony area attacked almost one-half was completely destroyed. The perforation is surrounded by a zone of practically uniform width, composed of the inner compact layer of the skull wall; and beyond this zone rises the surrounding rim measured in height by the thickness of the external compact layer. The irregular outlines are not such as would be produced by cutting, sawing, or scraping. There is still another oval cicatrice to be noted, which is sufficient in size to lodge the tip of the little finger; it is on the frontal bone 3 centimeters (1.2 inches) to the right of the medial incision, and does not amount to a perforation. That these oval lesions are the result of cauterization would be evident even without the support of the ancient authors.

The following is a partial list of localities in France (with references) where examples of Neolithic trephining have been found:

### Examples of Neolithic Trephining in France

Sepulture near Evreux (Eure). Père Montfaucon, *Antiquité expliquée* (trans. by David Humphrey), v, 132 (London, 1722).

Cavern at Nogent-les-Vièrges near Creil (Oise). Barbie du Bocage, *Mém. Soc. roy. des antiq. de France,* iii, 298-309 (1820). (Artificial

cave, over two hundred skeletons, one fine example of trephining, preserved in Museum of Natural History, Paris.)

Grottes de la Vallée du Petit-Morin (Marne). De Baye, *BSA,* 2d ser., ix, 225–244 (1874); *CIA,* Brussels, 393 (1872); *Mat.,* 2d ser., vii, 494 (1872).

Grotte de l'Homme-Mort (Lozère). Broca, *CIA,* Brussels, 182 (1872); Prunières, *AFAS,* Bordeaux (1872); Broca, *R. d'Anthr.,* ii, 9 (1873).

Dolmen de Sec (Lozère).

Rock shelter of Duruthy at Sordes (Landes). Lartet and Chaplain-Duparc, *Mat.,* 2d ser., ix, 101-167 (1874).

Dolmen de Bougon near Niort (Deux-Sèvres). *BSA,* 2d ser., x, 316 (1875).

Tumulus de Moret-sur-Loing (Seine-et-Marne). Chouquet, *BSA,* 2d ser., xi, 276 (1876).

Station of Entre-Roche near Angoulême (Charente). Chauvet, *BSA,* 2d ser., xii, 12 (1877).

Sepulture de Guerin, 2 kilometers (1.2 miles) from Montereau (Seine-et-Marne). Chouquet, *BSA,* 2d ser., xii, 13 (1877).

Allée couverte des Mureaux (Seine-et-Oise). Verneau, *Anthr.,* i, 157 (1890).

Dolmen de la Justice d'Epône (Seine-et-Oise). Perrier du Carne and L. Manouvrier, *BSA,* 4th ser., vi, 273–297; 4th ser., vi, 357–360 (1895).

Dolmen of Menouville near l'Isle d'Adam (Seine-et-Oise). Manouvrier, *BMSA,* 5th ser., iii, 601–604 (1902).

Dolmen de Conflans-Sainte-Honorine (Seine-et-Oise). Manouvrier, *REA,* vi, 57-58 (1896).

Dolmen de Vauréal (Seine-et-Oise). Manouvrier, *REA,* vi, 57-58 (1896).

Dolmen de Feigneux (Oise). Manouvrier, *REA,* vi, 57-58 (1896).

Dolmen de Champignolles (Seine-et-Oise). Manouvrier, *BMSA,* 5th ser., v, 67–73 (1904).

Sepulture of Montigny-sur-Crécy (Aisne). Delvincourt and Baudet, *BMSA,* 5th ser., vii, 207 (1906).

Allée couverte de Vaudancourt (Oise). Léon Coutil, *Mém. Soc. préh. franç.,* iv, 23 pp. (1915-1919).

Puits funeraire de Tours-sur-Marne (Marne). In the museum of antiquities, Saint-Germain.

Sepulchral chamber of Belleville at Vendrest (Seine-et-Marne). Baudouin, 264 pp., 16 pls. (Paris, 1911).

The sepulture at Vendrest contained 120 skeletons of both sexes, adults as well as children. Eight of the skulls had been trephined, one of them three times, and the margins of all three openings had healed. The operations were performed by means of scraping, the method being evidently the same as that employed in the highlands of Peru.

## Religion

Paleolithic man has left indubitable records of religious practices. The oldest records that have been preserved relate to provision for the dead. Mousterian man, whose ideas of art were so primitive as to escape detection, took pains to bury his dead. He evidently believed in a hereafter, one however that was material, since food was buried with the departed, presumably to meet material needs. In a hereafter like the present life there would be need of tools and weapons; these also were buried with the dead.

The Aurignacian and later races developed the burial rite further. They had other ways also of leaving imperishable records of religious practices, chief among them being art. Religion is older than art and may have served as the fertile soil in which art first took root, but as a means of tangible and imperishable religious expression, art justly claims first place.

The Paleolithic hunter, however capable he might have been mentally, had neither the time nor the solidarity of intellectual environment necessary to solve subtle problems of philosophy. He drew no nice distinctions between religion and magic. His God was the sum total of the unknown. That portion of his life span still to be lived lay in the domain of the unknown. The ruler of this domain must help him, would help him, if he could only make his needs known. To communicate with this power outside of, and beyond, self was a difficult problem without the medium of a written language, a problem which was solved only by the birth of art. We shall never know what sort of spoken language the cave man used nor what formality accompanied his vocal efforts at prayer. Fortunately, the means he chose as a substitute for the spoken word were not only unmistakably comprehensible appeals

to the Great Spirit, but also have been handed down in imperishable form to the present-day student of prehistory.

Paleolithic man was a hunter; he must often have gone hungry because game was scarce or big and powerful. Possession of the image assured or facilitated capture of the original. An inventory of cave art reveals the striking fact that the vast majority of examples represent animals difficult to capture or dreaded as beasts of prey. Not infrequently the figure is marked by bleeding wounds or represented as struck by, or accompanied by, weapons used in the chase.

The troglodyte hunter was too wise to kill the goose that laid the golden eggs. Animals, in common with himself, must reproduce. He had not learned to domesticate and in that manner provide for increase. Other ways were open; recourse was again had to magic in the guise of imagery. Numerous examples of male and female might be cited in which the intent of the artist is unmistakable, notable among which are the bisons modeled in clay at Tuc d'Audoubert (Fig. 148) and the reindeer carved in ivory from Bruniquel (Fig. 129).

It is a fact worthy of note that the dart thrower, so much in evidence during the cave-art period, effective in defense or in bringing down game, should nearly always have been carved in the semblance of some animal form. The museum at Saint-Germain possesses some fine examples: two, carved in reindeer horn, represent the bison, one of the most important food animals; a third, carved in ivory, bears the figure of a hyena, one of man's dread enemies; examples from other stations represent the horse (Bruniquel), the wild goat and the grouse (Mas d'Azil). These figures had more than an æsthetic significance (see Fig. 103).

If the effigy dart thrower possessed magic power, why not also the dart-shaft straightener? There is no doubt that the baton served as a shaft straightener and for testing the diameter of the shaft throughout its length. It was not practical to ornament the dart, so the cave man ornamented the baton instead. The dart whose shaft had passed through the hole of a decorated baton could not fail of its mark.

A favorite motive on batons was the horse, one of the chief game animals of the time. The baton from Mège at Teyjat has

engraved figures not only of the horse, but also of the hind, swan, eel, and three diminutive masked human figures. A baton found in the cavern of Montgaudier (Charente) bears the engraving of a seal, and one from Placard the head of a fox in the round. One of the finest examples of Paleolithic engraving is the baton with the figure of a browsing reindeer from the cave of Kesslerloch near Thaingen. The head of a hind is engraved on the baton of deer-horn from the cave of Valle (Santander). A reindeer is deeply incised on the baton from the cavern of Castillo (Santander).

Sculptured figures of the human female are among the oldest known authentic works of art. A majority of these belong to a type obviously intended to symbolize fecundity, emphasis being placed upon the parts that are necessary in the process of reproduction. In realistic art of any age it is not at all surprising that both primary and secondary sex characters should find expression, and in this respect the Upper Paleolithic age is no exception. In representations of the human form the female takes precedence. This might be accounted for, in part at least, by the fact that males were probably dominant among the artists. Some of the figures represent fine physical types (Fig. 165); in others, certain female characters such as fatness, largeness of hips and breasts, etc., were so persistently emphasized as to produce a more or less symbolic type, recurring at Brassempouy, Laussel, Mas d'Azil, Mentone, Lespugue, Mainz and Willendorf (see Figs. 159–164).

The reproductive organs are indicated only in rare instances, such, for example, as the Venus of Brassempouy, the Venus of Willendorf, and the *Venus impudique* and the *femme au renne* of Laugerie-Basse. Their occurrence as independent emblems adds strength to the supposition that sex worship existed in Paleolithic times. As additional evidence in support of this view there may be cited the double phallus of reindeer horn from one of the caves at Gorge d'Enfer [3] and the phalli from La Madeleine, from the rock shelter of Mège at Teyjat, and from Blanchard at Sergeac. Several representations of the vulva, engraved on stone, were also found at Blanchard by Didon, and a similar figure was found at La Ferrassie by Peyrony and at Montespan by Casteret. One of

[3] Not from Laugerie-Basse as some authors have stated.

the latest discoveries bearing on this subject is that of engraved figures of ithyphallic men followed by women with prominent pendant breasts. In the so-called sorcerer (Fig. 151), a mural masked human figure in the cavern of Trois-Frères, the sexual organs are emphasized, although scarcely to the point of sensuality.

There is evidence that masks were used either ceremonially or for stalking purposes, perhaps for both. A male figure wearing a mask representing the head of a horse has been reported from the Magdalenian deposits in the cave of Espélugues at Lourdes; also a bearded man with antlers and tail, engraved on schist, not unlike the sorcerer of Trois-Frères. Three engravings on a baton from the rock shelter of Mège at Teyjat in which the chamois-head masks are seen has been reproduced by Breuil (see Fig. 167). An example was also found at Mas d'Azil—a man wearing a bear-head mask. Still more remarkable is the sorcerer mentioned above. The masked figure has a tail resembling that of the horse and a head surmounted by a pair of deer horns. The sorcerer and the bisons in an adjoining cavern are symbolic of the supposed efficacy of magic.

An interesting sidelight on Paleolithic customs and beliefs is afforded by figures of human hands imprinted on the walls of nearly a dozen caves of France and Spain. In western Asia (Phœnicia) and among the Mohammedans of northern Africa, drawings representing the human hand are common and play a rôle in the religious and superstitious life of the people. The custom is met with also among the Bushmen and Hottentots. As early as 1812 Burchell records having seen an old woman of the Bushman tribe who had cut two joints from her right little finger and one from her left little finger to express grief for the loss of her three daughters. Stow states that finger mutilation was almost universal among the Bushmen and the Tambukis. He saw one party of Bushmen, each of whom had lost the little finger. The operation was performed with a stone knife. Its intent was to insure safe passage to the next world or a long career of feasting after death. The Hottentots are said to cut off the first joint of the little finger as a cure for sickness.

Figures of the human hand were reproduced among the prehistoric Australians by the same technique as that employed by the

Paleolithic hunters of western Europe. Similar figures of the hand were left on the cañon walls of Arizona by the ancient Pueblo races. According to Catlin, the amputation of the forefinger and the little finger of the left hand formed a part of the initiation ceremony of the Mandan Indians. George Bird Grinnell states that he was present when the body of a Crow chief killed in battle was brought into Camp Lewis (Montana) and saw the mother and a male relative each cut off a little finger of the left hand as a mark of the sincerity

FIG. 327. SELECTION OF HAND IMPRINTS FROM THE CAVERN OF GARGAS, HAUTES-PYRÉNÉES, FRANCE.

The hand, usually left, of the operator was applied to the cavern wall and coloring matter was thrown in such a manner as to adhere to the wall, leaving an imprint of the hand when the latter was removed. Both red (hatching oblique to the right) and black (hatching oblique to the left) were employed. The finger stubs, showing in all but one of these hands are mute witnesses to a sacrificial cult (propitiation), which held sway among the Aurignacians even more rigidly than it does to-day in some parts of the primitive world. Among the Bushmen a finger joint is sacrificed to express grief at the loss of loved ones. According to Catlin, finger amputation formed part of the initiation ceremony of the Mandan Indians. After Cartailhac and Breuil.

of their grief. Grinnell also met an old Ree (northern Cheyenne) who explained that the three fingers missing from his left hand had been sacrificed to the higher powers in order that he might take vengeance on a hated foe. Among the Tlingit, Haida, and Tsimshian tribes of the northwest coast, when several deaths occur suddenly in a family, the first joint of the little finger is sacrificed on the occasion of the funeral ceremony as a means of preventing further deaths.

It is significant that the Paleolithic cave artist who left representations of steatopygic, negroid human forms also left on the cavern walls imprints of the human hand, in some cases with

mutilated fingers, especially at Gargas (Fig. 327). The custom, therefore, is of ancient date and has had time to spread to distant parts of the world, whether from one or from a number of primeval centers it would be difficult to say. One may assume that the motives that have actuated primitive races of recent time to submit to such sacrifices were also potent with the Aurignacians of western Europe.

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# CHAPTER XIII

## THE BRONZE AGE

### Metallurgy

Some of the greatest discoveries of all time have been by accident. The reduction of metals from their ores evidently belongs in this class. Metals are especially prized for their tenacity, ductility, and fusibility. The first metals to attract the attention of prehistoric man were those which sometimes occur in the native state, such as copper, gold, silver, and iron. Because of its color and its wide distribution in the river gravels and sands, gold was in all probability the first metal to come within the ken of early man. For Stone Age requirements, however, gold was one of the least useful of metals. Moreover, the usual mode of occurrence of gold is in small particles. These would have to be assembled and converted into lumps through the art of melting, and the art of melting required time in which to develop. Even after lumps of gold were obtained, either through the process of melting or by the discovery of nuggets, and were fashioned by hammering into the desired shapes, they would be worthless except for ornaments on account of their softness.

In the native state, copper is not of such wide occurrence as gold, but it is found in greater abundance. The chief deposits of native copper are in Cornwall (England), Burra Burra (Australia), Yunnan (China), the Lake Superior district in North America, Bolivia, and Chile. In these districts it was no doubt the first metal to be known and utilized. Masses of native copper have been worked in the region of Lake Superior since very early times.

As a metal in nature, silver is of rare occurrence, and it is found in lodes or mineral veins, from which it can be obtained only through mining. It was practically unknown during the early Age of Metals.

Iron occurs native in two forms, cosmic (meteorites) and telluric. Both have a limited distribution; in fact, the only known masses of undoubted telluric origin are those at Ovifak, Greenland, discovered by Nordenskiold. Iron was thus the first metal to be utilized by the Eskimo, who fashioned knives from the Ovifak masses.

*Copper.*—Very little progress toward an Age of Metals could be made by the Neolithic races so long as they were dependent upon a knowledge of, and the supply of, native metals alone. That which finally ushered in the new era was the discovery of the art of extracting metals from their ores and of melting and casting them. When we consider that the oxide ores occurring on the surface of the earth are the most easily reducible of all minerals, the wonder is that it took the Stone Age artisans so long to make the discovery.

When by chance a lump of copper carbonate, tinstone, or hematite was used as one of the circle of stones surrounding the hearth and had become embedded in its embers, the lump would almost certainly be reduced to metal. Such a mass of metal would attract the attention of primitive man, and experimentation would soon disclose its properties of malleability and toughness, qualities destined to prove of great utility. The camp fire was in all probability the first metallurgical furnace.

The first step in the development of the furnace would be a simple hole formed in the hearth. Gowland states that on his visit to Japan in 1872 the evolution of the smelting furnace had only reached this stage. The second stage consisted in raising the smelting cavity or hearth above the ground and enclosing it within a low stone wall; it is represented in very early smelting works at Laurion, Greece.

After reduction, remelting is necessary in the case of copper and its alloys. To accomplish this the prehistoric metallurgist made a small copy in clay of the cavity of his camp fire, piled fuel over it, and thus obtained the molten metal. This clay copy is the prototype of our modern crucible. In the Lake Superior district, axes, lance heads, and other forms were fashioned from the native copper by hammering. The prehistoric Indian tribes of this region never learned to melt the native copper and cast it in molds; hence

they had not passed beyond the Stone Age culture at the time of the discovery of America by Columbus.

In many parts of the world, oxidized copper ores are associated with ores of tin, arsenic, antimony, nickel, or silver in small amounts. The reduction of these ores would result in natural or accidental alloys. In England, where copper and tin are associated, bronze was produced. In Hungary antimony is associated with copper, and the early metal implements are of an alloy not unlike bronze. In Egypt and Ireland one finds implements made of a natural alloy of copper and arsenic, while in some parts of Germany the alloy is of copper and nickel. The earliest metal implements are often made simply of impure copper. On this account certain authors are inclined to recognize an Age of Copper immediately preceding that of Bronze. A more logical attitude would be to consider this initial stage in the use of metals as an early phase of the Bronze Age.

The methods employed by prehistoric man in the manufacture of copper and bronze implements are most interesting. The metal was not dipped from the furnace in a molten state but was taken while in the act of solidifying. The cake thus removed was broken up on a stone. The pieces were remelted in dishes of clay, the contents of which were poured into molds of stone, clay, or bronze. The castings were generally hammered at the edges, which process served to give the latter the desired degree of hardness.

In Europe the earliest production of copper from its ores probably took place in Cyprus, where vast piles of ancient slag are seen in many localities. Cyprian copper was sought after in Homeric times and was sent as tribute to Egypt at a still earlier period. In fact, the words *copper* and *Cyprus* have a common derivation. The mines of southeastern Spain are very old. In the Austrian Tyrol, on the Mitterberg Alp, there are prehistoric copper mines and heaps of slag associated with stone implements and with pottery resembling that from the pile dwellings of Mondsee. The mines at Monte Catini and Capanne Vechie in Tuscany are well known; there is also an ancient mine at Agordo, in the north of Italy near the Tyrolian frontier.

There are copper mines in Asia that antedate any in Europe. Those of the peninsula of Sinai were worked for copper in

3733 B.C. and earlier. South of Trebizonde and near Erzerum in Armenia, also at Diarbehr in the upper basin of the Tigris, vast accumulations of mining and metallurgical refuse and numerous excavations mark the sites of a remote but important copper industry, according to Gowland. Important prehistoric copper mines have been reported from Jaipur, Bengal, and the Madras Presidency, in India.

It is reasonable to assume that copper was in use in Egypt as early as 5000 B.C. Bricks, said to bear the name of King Ur-Nina of Chaldea (about 4500 B.C.), were associated with copper figurines, which as specimens of metal working are in advance of Egyptian metal work of approximately the same date. This would seem to indicate that copper was known to the Chaldeans earlier than to the Egyptians. In the lowest stratum of the prehistoric city at Troy, Schliemann found four knives, one of them gilt and two with rivet holes. The stratum dates from 3000 to 2500 B.C. The use of copper in Cyprus dates from at least 3000 B.C., for the tribute vases paid to Thotmes III (about 1500 B.C.) are of a workmanship that required many centuries to develop. Moreover, copper for the manufacture of the bronze weapons found at Knossos by Evans was probably obtained in Cyprus, and these weapons date from about 2500 B.C. According to Chinese annals, the nine bronze tripod cauldrons, afterward mentioned in historical records, were cast about 2205 B.C. The beginning of a copper industry in China therefore might easily date back as far as 3000 B.C.

*Tin.*—Like copper ore, if a lump of tin ore were by chance embedded in a camp fire, the result would be metallic tin. In Cornwall, tin ore did not have to be mined; it was abundant and occurred at the surface of the ground or at a shallow depth in the river gravels. According to Gowland, no cakes of tin produced from the earliest smelting of the ore have survived in Cornwall, but shallow holes in the ground, partially filled with charcoal and ashes and often mixed with fragments of tin, have been discovered near ancient workings in the old river gravels. These are remains of furnaces of perhaps the earliest period.

The furnaces were, as a rule, merely narrow, shallow trenches in the ground, and the smelting operation was of the simplest kind

Gowland describes the trench as being lined with clay and filled with brushwood, above which small logs of wood were piled. Once the logs were fiercely burning and the trench full of glowing embers, small quantities of ore were thrown on the fire from time to time. More wood and ore were added until the desired amount of tin had accumulated in the trench. The fire was then raked away, and the tin ladled out into a hole in the ground or into a clay mold near the furnace.

The ancient world obtained most of its tin supply from Cornwall, Spain, and Portugal; the Etruscans extracted tin ore on an extensive scale at Campaglia Marittima, near the coast of Tuscany. Tin ores occur in lesser deposits in several other parts of Europe; the tin veins of Cornwall recur in Brittany; remains of ancient workings have been reported from Pyriae, near the mouth of the Loire, and at the Villeder (Morbihan). Ancient tin mines have been found in Persia at Khorasan. An abundance of tin ore is found in the river gravels in Yunnan, China. These tin-bearing deposits are near deposits of copper ore and native copper; they have been exploited since very early times.

*Gold.*—The Stone Age artificer might well have worked gold nuggets into the form of ornaments. The oldest recorded ingot of gold that has come to the attention of the author is that found by Quibell in a prehistoric grave at El Kab. The oldest mining map is depicted on an Egyptian papyrus in the collection at Turin; it represents a mining district of the time, either of Seti I (1350 B.C.) or of Rameses II (1330 B.C.). The locality covered by the map is not definitely determined, but ancient mines are known to be scattered over Upper Egypt, Nubia, and the Soudan. These ancient mines consist of shallow pits in detritus, shallow trenches along the line of a vein, and subterranean workings; Gowland believes the first to be the oldest. Trenches, as well as shafts, are sometimes in very hard rock, the mining of which was facilitated by the action of fire.

The lumps of gold ore from the mines were crushed by stone mauls on a hard stone, or on the country rock, many holes in the latter bearing testimony to this operation. The coarse ore was next taken to rubbing mills where the particles were reduced to greater fineness; the final grinding operation was in the querns. After this

the product was placed on the smooth inclined surface of the washing table. In the washing process the stone particles were carried away with the water and the gold remained behind. The final washing was in shallow earthen dishes. The gold was then melted in crucibles and cast into ingots.

In Europe the chief auriferous deposits that were available to prehistoric man were in Spain, Gaul, Thrace, Dacia, Dalmatia, and Ireland. Signs of ancient alluvial mining are abundant in the streams of the group of mountains to the north of Salonica. In the lower slopes and streams of the Altai Mountains in western Mongolia there have been found evidences of extensive prehistoric mining operations.

*Silver.*—As a native metal, silver has but a limited distribution, occurs sparingly, and very rarely in nuggets. For these reasons it remained unknown to early man until long after the initial stages of the Bronze Age. Silver is invariably present in the common lead ores, and it was no doubt obtained from these, or from silver ores containing lead. When lead ores are smelted, lead containing dissolved silver is the product. The extraction of silver began as a by-product of lead smelting, so that a knowledge of lead came first. Galena, the principal lead mineral always contains silver, occurs widely, and in vast deposits outcropping at the surface of the ground. These outcrops were exploited at an early period. The smelting of argentiferous lead ores was very similar to that of copper. The silver was then extracted from the lead by the process of cupellation.

Silver was apparently first used in Asia. A silver pin, earring, and piece of wire were found in the lowest city (3000 to 2500 B.C.) at Troy. At the level of the third city (2500 to 2000 B.C.) a large quantity of silver, comprising vases, vessels, goblets, jugs, bars, and personal ornaments, was discovered. In China, copper, gold, and silver were all used in barter as early as 2400 B.C. The use of silver in Italy probably dates from about 2000 B.C., but silver objects are of rare occurrence throughout the Bronze Age in southern Europe, and the metal was practically unknown in northern Europe until the Roman period. In Egypt, silver was not much used until a comparatively late date. The early peoples of the Mediterranean derived their silver chiefly from Asia Minor,

Macedonia, Thrace, Laurion, Siphnos, Sardinia, Dalmatia, Gaul, and Spain.

*Lead.*—The physical properties of lead are such that it played a very insignificant rôle during the Ages of Bronze and Iron. Its metallurgy has already been touched upon in connection with silver. There are but few objects of lead dating from the Bronze Age; perhaps the most useful are the net sinkers. Shapeless masses of lead were found in the oldest city at Troy (3000 to 2500 B.C.). Disks of lead are reported from Mycenæ. A leaden statuette was found in a beehive tomb at Laconia; it is a casting of considerable merit and apparently represents the primitive Mycenæan costume. At Nagada in Egypt, Petrie found a wooden hawk coated with lead which is probably as old as the lead found in the lowest city at Troy.

*Iron.*—Iron ores are easily reduced to the metallic state, and, once reduced, no fusion is necessary in order to fashion the metal into implements. That this is not true of copper has been pointed out. Moreover, iron ores may be reduced to metal in an ordinary wood or charcoal fire and without the use of bellows of any kind. The temperature required for the reduction of iron is only 700° to 800° C., whereas that required for copper is about 1,100° C. Under such conditions it is rather remarkable that the reduction of iron ores did not antedate the reduction of copper ores. Primitive methods of extracting malleable iron from the ore are still practiced in Spain, Finland, India, Borneo, Japan, and Africa. In Africa, south of the Sahara, there was no Bronze Age properly so-called, the Iron Age succeeding immediately the Neolithic Period. Cast-iron dates only from the Middle Ages, the primitive furnaces being too low and their blast insufficient for its production.

Remains of early iron manufacture are found in many localities of western Asia. The Assyrians probably obtained some iron from the Tiyara Mountains, to the northeast of Nineveh. At Khorsabad, in the palace of Sargon, erected about 710 B.C., Victor Place found some 160,000 kilograms (17,600 short tons) of iron in the form of small bars drawn out at the ends and perforated for convenience in handling. Similar forms of iron bars were employed in Roman times and even down to the nineteenth century in Sweden and Fin

land. The Assyrians probably began to make use of iron as early as 2000 to 1500 B.C.

In northern Persia iron ores were worked extensively near Persepolis and in the Karadagh district. Iron mines of southern India were worked as early as the tenth century B.C., and in the Punjab even earlier, for the use of iron in the making of weapons is said to be mentioned in the Rig-Veda. The western provinces of China are rich in iron ores. The earliest references to iron in Chinese writing do not antedate 1000 B.C.; however, the magnetic compass, which implies the use of steel, is said to have been invented by the Chinese prior to this date. Basing his statement on recent researches in early Chinese history, Brough believes iron to have been in use in China as early as 2357 B.C.

The following list of reputed finds of iron used at an early date is adapted from Gowland; it will, no doubt, suffer change with the progress of discovery:

### Discoveries of Early Iron

| | | |
|---|---|---|
| Predynastic times in Egypt.—Iron beads. | | |
| IVth dynasty in Egypt, | 2900 B.C. | —Piece of iron in joint of the great pyramid at Gizeh. |
| Vth dynasty in Egypt, | 2750 B.C. | —Pieces of a pickax from Abusir. |
| XIIth dynasty in Egypt, | 2000 B.C. | —Spear head, Nubia. |
| XVIIIth dynasty in Egypt, | 1600-1400 B.C. | —A sickle, Karnak. |

| | | |
|---|---|---|
| About | 2357 B.C. | —Iron used in China (Brough). |
| About | 2000 B.C. | —Iron in second city, Troy. |
| About | 1500 B.C. | —Iron knife, Troy. |
| About | 1400-1300 B.C. | —Achaeans enter Greece with iron swords (Ridgeway). |
| About | 1200 B.C. | —Beginning of Iron Age in Crete. |
| About | 1100 B.C. | —Iron implements at Villanova, northern Italy. |
| About | 1100 B.C. | —Use of iron in Etruria. |
| About | 885-860 B.C. | —Ashur-nasir-pal, king of Assyria, brought iron from Carchemish. |
| About | 881 B.C. | —Assyria, tribute lists of Moschi. |

About 800 B.C.—Destruction of Damascus, 5,000 talents of iron taken.
About 800 B.C.—Iron swords in central Europe.
About 800 B.C.—Iron Age in Britain.
About 700 B.C.—Trading bars in Sargon's palace.
About 700 B.C.—Iron weapons, Hallstatt.

## Bronze Age Chronology [1]

As there was an intermediate or transition stage between the Paleolithic and the Neolithic Periods, so is there an intermediate stage between the Neolithic Period and the Bronze Age. The first metals to be employed on an appreciable scale were copper and gold. The first objects of metal were of copper unmixed with tin. This fact has been recognized in Bronze Age chronology, especially in Italy, by calling the initial stage the *Encolithic* Epoch. This stage is so abundantly represented in southern Europe, Hungary, Switzerland, southern France, Czechoslovakia, Saxony, and even in Ireland, that some authors have gone a step further by attempting to create an Age of Copper. The tendency now is, however, to combine the initial copper phase with the first epoch of the Bronze Age.

Thomsen of Copenhagen provided definitely for an Age of Bronze in his triple classification of prehistoric times. It was reserved for his compatriot and successor Worsaae to make the first attempt at a subdivision of the Bronze Age. In 1859 he proposed two epochs based on finds made in Scandinavia, northern Germany, and the British Isles—an early epoch of inhumation and a later epoch in which the dead were generally incinerated. He was as yet unacquainted with the initial copper stage. Then followed, in 1875, G. de Mortillet's classification, also into two epochs. De Mortillet's first epoch was the *Morgian,* named for the station of Les Roseaux at Morges on the Lake of Geneva. It was characterized by the first appearance of bronze, by objects simply run in molds, by flat axes of a type recalling late Neolithic patterns, and by short swords.

[1] With the age of metals is ushered in the period often referred to as *protohistoric.* In Greece the Bronze Age is roughly synchronous with Mycenaean culture, in France and England with the early Celtic.

His second epoch was the *Larnaudian,* named for the station of Larnaud (Jura). It was characterized by objects both molded and hammered, by axes with winged poles, by axes with sockets, and by long swords. This classification was followed in the two editions of *Musée Préhistorique* (1881 and 1903) by de Mortillet and his son Adrien, and is still employed by the latter in his courses at the École d'Anthropologie (Paris).

FIG. 328. THE PRINCIPAL TYPES OF THE BRONZE AX DURING THE BRONZE AGE.

No. 1 is a plain flat ax belonging to the first epoch; No. 2 has marginal ridges, second epoch; No. 3 has wings, third epoch; No. 4 with wings and No. 5 with end socket, fourth epoch. Photograph by Tschumi.

The chief contributor to Bronze Age chronology was Montelius of Stockholm, who, beginning in 1885, wrote several important monographs on the subject covering practically the whole of Europe. The result was a classification of the Bronze Age into five epochs. Déchelette, especially well versed in Celtic archeology, adopted the classification of Montelius after reducing the number of epochs to four. This was done by giving one part of Montelius's fourth epoch to the new third and the other part to the new

fourth epoch. Déchelette also introduced new types into all four epochs.

The four epochs as accepted by Déchelette and applied to western Europe may be characterized as follows (Fig. 328):

Epoch I (including the copper or Eneolithic phase), *ca.* 2500 to 1900 B.C.—Stone implements, especially arrowheads, still abundant; arms and weapons of copper or of bronze containing but a small quantity of tin; flat axes; small triangular poniards with tongue or with rivets; toward the end of the epoch, poniards with bronze handles; poniards hafted as axes; pins; lozenge-shaped awls; glass tubes in the

Fig. 329. Bronze ax with wings at the pole end from möringen, lake of bienne, switzerland.

This ax, which belongs to Epoch IV of the Bronze Age is one of the few examples in which the handle has been preserved. Photograph by Tschumi.

form of a linear series of fused beads; bone worked in the same form; beads of gold, bronze, and altered turquoise (*callais*); crescents of gold; caliciform pottery vases; vases with handles attached to shoulder; inhumation sepultures as a rule; dolmens rare; a few tumuli.

Epoch II, 1900-1600 B.C.—Bronze rich in tin; axes with plain borders (*haches à bords droits*) only slightly elevated; axes with semicircular blades; triangular poniards with rounded riveted base; pins with spherical perforated heads; open bracelets with pointed ends; vases with two to four handles; same mode of burial as in Epoch I.

Epoch III, 1600-1300 B.C.—Axes with borders slightly raised above the plain of each face (*haches à bords droits élevés*); axes with transverse ridges or shoulders (*haches à talons*); axes with median wings; long, slender poniards; slender nonpistiliform swords; knives with bronze handles; pins ribbed at the head; pins with wheel heads; open bracelets with obtuse ends; ribbon bracelets terminating in volutes;

pottery vases with deeply incised patterns; vases with mammae-shaped ornamentation; sepulture by inhumation for the most part.

Epoch IV, 1300-900 B.C.—Axes with wings at the pole end (Fig. 329); axes with end sockets; swords with flat tongue perforated for rivets, or with a longitudinal opening; swords with oval pommel; swords with antennae at the pommel, the swords being for the most part pistiliform; socketed knives and arrow points; kidney-shaped bracelets; fibulae with simple and with crenelated arches; double razors; bridle bits; pottery vases of many types; incineration dominant.

### Habitations

The Bronze Age population of western Europe continued to live in barbaric simplicity. As was the rule with their Neolithic predecessors, the principal architectural structures were reserved for the dead. Even down to the time of Cæsar, the dwellings continued to be made of light and perishable materials; brick and tiles were unknown.

There were three classes of villages, (1) terrestial, (2) lacustrine, and (3) those intermediate between the two known in Italy as *terremare* and in Ireland as *crannogs*.

Protection not only from wild beasts but also from hostile tribes was one of the chief preoccupations of prehistoric man. Villages on land were defended by position on a height or by artificial fortifications. Where lakes abounded, a very satisfactory means of defense was achieved by building the villages on piles over the water. This system was particularly well developed in Switzerland even during the Neolithic Period. In the broad, flat valley of the Po, villages were protected by diverting streams so as completely to surround the clusters of dwellings.

The change from the Stone Age to the Bronze Age took place gradually, without the least suggestion of a hiatus. Thus the important Neolithic fortified villages continued to be occupied after the introduction of bronze. The Camp de Chassey (Saône-et-Loire) was inhabited without interruption from the Neolithic Period to the Roman Epoch. Caves and rock shelters were also inhabited to some extent during the Bronze Age. The rock shelter of Bois du Roc in the commune of Vilhonneur (Charente) is one of the best dated examples because of the pottery found there.

The lake dwellings of the Bronze Age differ from those of the Neolithic Period in being situated farther from the shores of the lakes. Instead of being from 40 to 90 meters (131.3 to 295.5 feet) from the shore, they are often situated 100 to 400 meters (328.3 to 1,313.3 feet) distant. They are also much larger than the Neolithic pile settlements, although less numerous. The geographic distribution of the Neolithic and Bronze Age pile dwellings would seem to indicate that such dwellings originated in the east and that the custom gradually spread westward. The lake dwellings of Upper Austria and Carniola are for the most part of Neolithic age, as are also those of eastern Switzerland, whereas Bronze Age lake dwellings are dominant in western Switzerland and Savoy.

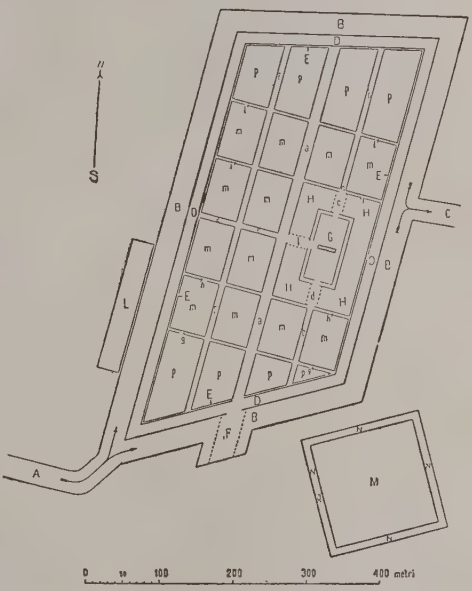


FIG. 330. TERRAMARA OF CASTELLAZZO DI PAROLETTA, COMMUNE OF FONTANELLATO, PARMA, ITALY.

The village was built on land with a wide moat for protection. *A*, canal for the intake of water, 30 meters wide; *B*, ditch for the circulation of water, 30 meters wide; *C*, outlet canal, 30 meters wide; *D*, roadway; *F*, bridge, 60 meters long; *G*, terrace; *a*, central roadway in line with the bridge; *e*, central cross road; *b*, *f*, *g*, *h*, *i*, *l*, other roadways; *c*, *d*, *I*, wooden bridges; *m*, *p*, islets. After Pigorini.

The most important Bronze Age lake villages of western Switzerland are: Chevroux, Concise, Corcelettes, Cortaillod, Auvernier, and Estavayer (the last two especially rich) in Lake Neuchâtel; Mörigen (or Möringen), Vinelz, and Nidau in Lake Bienne; Morges in Lake Geneva; and Wollishofen in Lake Zurich. In the bay of Morges there are four pile villages, the two chief ones known as La Grande Cité and Les Roseaux. It was Les Roseaux that de

Mortillet chose as the type station for his Morgian Epoch, corresponding to Bronze Age II and III of Montelius and Déchelette. The copper stage, or Bronze Age I, is represented at various Swiss lake villages, notably at Vinelz (Lake Bienne) and Saint Blaise (Lake Neuchâtel). The closing epoch (IV) of the Bronze Age is well represented at Colombier, Corcelettes, and Mörigen.

All four epochs of the Bronze Age are traceable in the Lake dwellings of Italy. The most important are: Peschiera in Lake Garda near the source of the Mincio River; Mercurago near Arona; and those of Lake Varese. The Bronze Age lake villages of France are situated in Lakes Bourget, Annecy, Geneva, and Châlain.

The terremare of the Po valley resemble lake villages since they are built on piles, but with this difference, that they are constructed over *terra firma* and not over water; they depend on an embankment and ditch filled with water for their protection. The terramara type of village is especially abundant in the provinces of Modena, Parma, and Reggio. They belong to the well developed phases of the Bronze Age.

One of the best examples of the terramara is that of Castellazzo di Paroletta in the province of Parma (Fig. 330). The surrounding ditch is 30 meters (98.5 feet) wide and is filled with running water. The total area amounted to some 20 hectares (49.4 acres). At Castione, another Parmian terramara, Strobel and Pigorini were able to distinguish the remains of three villages built successively after fires. Land villages built on piles are lacking north of the Alps, except in Hungary (Danube Valley), where they belong to the Iron Age.

### Hoards or Caches

Relics of the Bronze Age are found as isolated specimens and in sepultures, but by far the greatest number have been preserved to our time in the form of hidden treasure, that is to say, in hoards or caches. A single cache may contain but a few specimens; on the other hand, it may contain thousands. In 1877, at Bologna during a process of sewer construction, an enormous earthen vase was brought to light containing 14,800 objects of bronze (including fragments)—axes of various types, chisels, knives, gouges, lances, sickles, harness trappings, ornaments, etc.

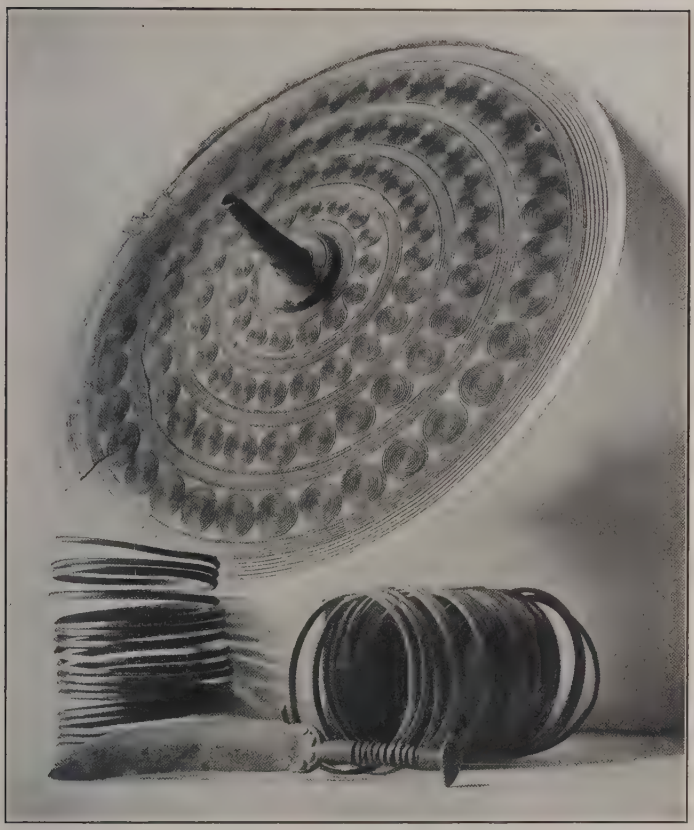

FIG. 331. A CACHE OF BRONZE AGE OBJECTS FROM A PEAT BOG AT LANGSTRUP, ZEALAND, DENMARK.

The large plaque with beautiful spiral decoration was fastened to the front of the belt. The objects below it are a knife with a handle imitating that of a sword and a pair of spiral bracelets. The objects all belonged to a female who lived during the first epoch of the Bronze Age in Denmark. Scale, $\frac{1}{3}$. After Neergaard.

It is not always easy to determine the origin and nature of caches. Some are evidently foundry deposits, some are treasures, others are presumably votive offerings. The number of caches found in France alone is nearly eight hundred. Of these, more than half are referable to Bronze Age IV. Caches belonging to Bronze

FIG. 332. PART OF A CACHE OF ONE HUNDRED AND THIRTY BRONZE OBJECTS FOUND IN THE PEAT BOG OF MAGLEBY NEAR SKJELSKOR, ZEALAND, DENMARK.

The two vases, have slits in the rim for suspension. The object in the right center is a bronze decoration for the belt. The remaining objects are a torque, two pairs of bracelets, a chisel, and two axes with end sockets. All belong to the fourth epoch of the Bronze Age. After C. Neergaard.

Age I are very rare. The oldest caches, representing epochs, I, II, and III, are grouped largely in the valley of the Gironde and along the Atlantic littoral. Déchelette concludes that bronze reached France by way of the Atlantic and spread northward and eastward, a second route of entry being by way of the Danube and Switzerland.

The peat bogs of Denmark have yielded some remarkable caches of Bronze Age objects. A good example dating from the first epoch of the Bronze Age was found at Langstrup (Zealand). The principal objects found there had to do with the apparel and per-

FIG. 333. UNIVALVE STONE MOLDS FOR CASTING THREE AXES AND A KNIFE.
Scale, *ca.* ½. After Thurnam.

sonal adornment of the female. The plaque for the belt is particularly large and beautifully ornamented, and must have been a prominent feature of the female outfit. The spiral ornamentation on the plaque is in keeping with the spiral bracelets; both throw light on the extent to which the spiral motive was developed and appreciated during the early part of the Bronze Age (Fig. 331).

Another interesting cache of one hundred and thirty bronze objects was found in the peat bog of Magleby near Skjelskor (Zealand). Among the more important pieces there should be mentioned decorated vases with slits for suspension near the rim, belt plaques, torques, bracelets, chisels, and axes. This cache belongs to the fourth epoch of the Bronze Age (Fig. 332).

### The Casting of Bronze

The first molds employed in the Bronze Age were of stone and for the most part consisted of but a single valve (Fig. 333). A flat stone served to cover the cavity receiving the molten metal; the canal through which the molten metal is poured into the cavity of a bivalve mold is unnecessary. Examples of the univalve type were found by the Siret brothers in the region of El Argar, Spain; they have also been found in France, Ireland, Scotland, Sardinia, Troy, and by Mills in the mounds of Ohio.

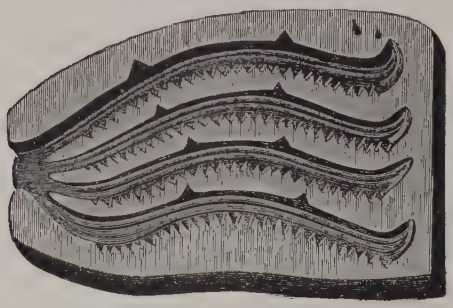

Fig. 334. Bivalve stone mold for casting saws, from Vidtsköfle, Scania.

In this mold four bronze saws could be cast at one time. Scale, ½. After Montelius.

Beginning with the second epoch of the Bronze Age, molds multiply. To stone molds are added those of bronze and of pottery. Approximately half of the known molds were for the casting of bronze axes of various types, especially those with shoulder (*talon*) and those with wings or with socket; molds for pins, bracelets, lances, knives, hammers, saws (Fig. 334), money, chisels, buttons, swords, and clasps are of much less frequent occurrence. In the museum at Lausanne there are fragments of hollow bronze bracelets that had been hammered into knives as a means of economizing to the greatest possible extent in the use of so important an alloy.

Many molds were found at Auvernier and Möringen, leaving no doubt as to the local manufacture of bronze objects. Bivalve molds of bronze served in the manufacture of wax models, which in turn could be surrounded by a clay paste. By melting the wax a second mold was obtained, in which molten bronze was poured. Molds dating from the Bronze Age have been found in practically all countries of Europe, testifying to a wide dissemination of the knowledge of casting.

Crucibles of stone and pottery have been found, but they are of much rarer occurrence than molds. This is true also of bellows tubes of clay. Ingots, generally lenticular in shape, are met with on foundry sites and elsewhere.

Throughout the Bronze Age, soldering was practically an unknown art. The artificers of the time were content to construct their vessels, helmets, belts, and cuirasses by a system of riveting, the conical heads of the rivets contributing at the same time to the ornamentation of the product. Relief ornaments on cast objects of bronze were generally traced on the mold and retouched after the casting process was finished. The metal workers of the Bronze Age were masters in the art of engraving. Gravers of bronze and flint were employed.

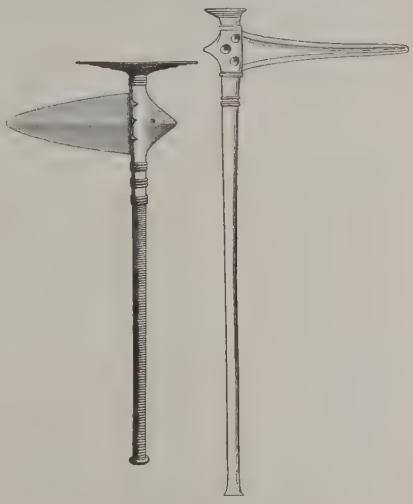

Fig. 335. Bronze halberds of epoch IV of the bronze age.

The one on the left is from Trieplatz, Brandenburg; the one on the right from Stubbendorf, Mecklenburg, Germany. Scale: at the left, $\frac{1}{10}$; at the right, *ca.* $\frac{1}{6}$. After Montelius.

### Weapons

The principal offensive arms of the Bronze Age were the poniard and forms developed from it, such as the sword and lance. The sword is a long poniard, and the lance a poniard at the end of a shaft. The poniard was sometimes hafted like an ax to form the so-called halberd (*hache-poignard*), one of the characteristic types of the first epoch of the Bronze Age (Fig. 335).

The evolution of the sword during the last three epochs of the Bronze Age forms an interesting subject for study. The swords of the second and third epochs were preëminently weapons for sticking or stabbing. With the fourth epoch the blade became pistiliform in shape and was used for cutting as well as stabbing

FIG. 336. BRONZE SWORDS FROM THE BRITISH ISLES.

Swords of this type (cut and thrust) were developed during Bronze Age IV. Photograph from the British Museum.

(Fig. 336). European swords almost without exception are two-edged. The bronze sword with but a single edge is practically confined to Assyria, Palestine, and Egypt.

Lance heads were widely employed during the Bronze Age (Fig. 337). There are two distinct types, those attached to the shaft by means of a tongue and those provided with a socket into which the shaft fits. The first mentioned dates from the beginning of the Bronze Age. The transition to the socket type occurred during the second epoch; this type was in general use during the third and fourth epochs of the Bronze Age. The Mycenæan warriors carried lances with socketed heads the workmanship of which excelled that seen in western Europe. Some eastern lance heads dating from the close of the Bronze Age and the beginning of the Iron Age are veritable works of art; they are extremely elongated, attaining a maximum length of 72 centimeters (28.3 inches).

Bronze arrowheads are not of so frequent occurrence as might be expected. This is no doubt in part due to the great esteem in which the flint arrowhead was still held; in fact, some of the finest known flint arrowheads date from the Bronze Age. Bronze arrowheads, like the lance heads, were for the most part attached to the shaft by means of a tongue or a socket. Archers' cuffs or fenders made of bone, stone, or pottery are not infrequently met with, not only during the Neolithic Period, but also in deposits dating from the first epoch of the Bronze Age. A different method of protection seems to have been adopted by the archers of the second and later epochs, as these *plaquettes* no longer occur; they are supposed to have been replaced by a sort of leather gauntlet, perhaps similar to those represented on certain figurines of archers discovered in Sardinia.

Defensive armor was developed to a considerable degree during the Bronze Age. The bronze helmet does not appear until the fourth epoch. During the first three epochs head protection was probably limited to a simple leather cap; it will be recalled that the swords of these epochs were suited primarily to purposes of thrusting or stabbing. During the fourth epoch the sword blade was lengthened and took on a pistiliform shape; it was perfectly adapted for purposes of cutting or slashing. To meet this new danger to the head, bronze helmets were invented; many of these have been

FIG. 337. PART OF A BRONZE AGE CACHE OR HOARD FOUND AT DOWRIS, IRELAND.

The objects are a bell, two lance heads, three swords, and two trumpets. Photograph from the British Museum.

recovered. Besides, we have the supplementary evidence of figurines wearing armored headgear of this kind.

Bronze cuirasses did not appear until the close of the Bronze Age. Previous to this, cuirasses of leather, fortified perhaps by a trimming of wild-boar teeth, were in use. The bronze shield is confined practically to the British Isles and Scandinavia (Fig. 338). One of the best known examples is the round shield in the Stockholm museum found at Nackhälle, near Varberg, Halland. The gold poitrel mounted on copper, reproduced in Figure 339, served

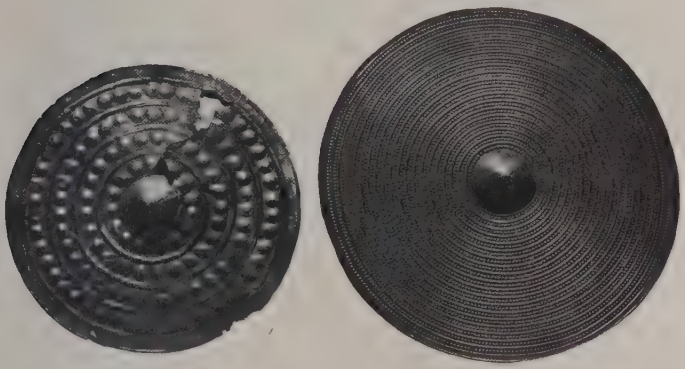

FIG. 338. BRONZE AGE SHIELDS FROM THE BRITISH ISLES.

The one on the left, with four zones of bosses, is from the Thames; the other from Wales. Photograph from the British Museum.

as armor for a pony. It was found in 1833, in association with the bones of a man, in a cist covered by several hundred loads of pebbles and other stones forming a cairn at Mold (Flintshire); it dates from the close of the Bronze Age.

Most of the Bronze Age shields were made of wood, leather, and other perishable materials. Some of these were presumably provided with a bronze umbone, judging from discoveries made at Auvernier and other lake villages.

In this connection, because of its probable use in war, the bronze trumpet should be mentioned. That music serves a variety of uses not associated with war, however, should not be lost sight of; it plays just as important a rôle in religion and ceremony, also as an

independent art. That it had already reached a relatively high degree of development in the Bronze Age, no better testimony is needed than the structure and capabilities of the remarkable bronze trumpets found in a Danish peat bog and now preserved in the Copenhagen museum (Fig. 340). Trumpets belong to the close of the Bronze Age.

FIG. 339. LATE BRONZE AGE GOLD POITREL FROM A CAIRN AT MOLD, FLINTSHIRE, WALES.

This piece of armor was made to protect the breast of a horse. Bronze Age IV. Photograph from the British Museum.

## TOOLS AND UTENSILS

An inventory of Bronze Age objects points to a varied industry. The ax leads the list. The stages in its evolution are seen in the five principal types. The flat axes had for their prototype the thin-poled flint axes of the late Neolithic Period. They belong to the first epoch of Bronze. The development of marginal ridges began in the second epoch and continued to develop throughout the third epoch (axes with plain borders). Before the close of the third epoch, there likewise developed a transverse ridge about midway between the edge and the end of the pole. Before the close of this epoch, the marginal ridges are transformed into wings that almost meet at a median point (ax with wings). Beginning with the fourth epoch, the wings are shifted to a place near the end of the pole. The next step, taken before the end of the fourth epoch,

leads to the ax with end socket (see Fig. 328, No. 5). Axes are for the most part without ornamentation. There was an evolution of the adz along similar lines.

Knives dating from the first and second epochs of the Bronze Age are rare; they occur much more frequently in deposits of the third and fourth epochs. Three types are easily distinguishable: those attached to the handle by means of a tongue (*couteaux à languette* and *à soie*), those with socket for hafting, and finally knives in which handles and blades are cast in one piece. The last two types are practically limited to the fourth epoch. Knives differ from poniards in that the edge is confined to a single margin.

FIG. 340. BRONZE AGE TRUMPET FOUND IN A PEAT BOG NEAR COPENHAGEN.

This is a Scandinavian type of trumpet; fourteen of the twenty-three which have been discovered in the peat bogs of Denmark, were in a perfect state of preservation. After Hammerich.

The bronze razor is as distinct in type from the bronze knife as is the steel razor from the steel knife. It is worthy of note that one form of the bronze razor is not unlike the modern steel razor. The practice of shaving was already established in pre-Mycenæan times by the use of obsidian blades. The peculiar mode of fracture of obsidian is such as to make the edge of a flake especially effective as a razor; this is set forth at length in an article published by the author in 1900.[2]

In some respects the sickle is more closely related to the knife than is the razor. The sickle is simply a hooked knife; the attachment of the blade to the handle is generally by means of either a tongue or a socket. Bronze sickles appear beginning only with the

[2] *American Anthropologist*, N. S., Vol. II, pp. 417-421.

second epoch. During the first epoch tillers of the soil were limited to simple flint blades for purposes of cutting their grain. Use was made also of wooden sickles armed with toothed blades of flint.

Recurved and barbed fishhooks abound during the Bronze Age. Several have been found in the Bronze Age stations of Lake Varese, northern Italy; they are also abundant in Switzerland. In some, the base is sharply recurved to form a ring in which the cord was fastened; in others, a depression, either single or in series, answers the purpose. Finally there should be mentioned the bronze harpoons from the station of Peschiera in the Lake of Garda, belonging to the transition from the Bronze Age to that of Iron.

Fig. 341. Male costume during the early Bronze Age.
After Müller.

### Articles of the Toilet and Personal Adornment

Our knowledge of male and female attire during the Bronze Age is based largely on garments found in Scandinavian oak coffins, especially from Jutland and Schleswig, and dating from the first epoch of the Age. Men wore on the head a round and rather high cap. The body was wrapped in a four-cornered piece of cloth which reached from the armpits to the knees. The upper corners ended in bands or tips to which leather thongs were sewn; these probably passed over the shoulders. A woven band or leather belt passed round the waist and was fastened in front with a buckle. An oval mantle covered the otherwise naked shoulders and arms. It reached to the knees and was wide enough to permit of being easily drawn together in front and held by means of fibulae (Fig. 341). If the climate was then as rigorous as now, this must have been a rather airy costume. It is possible that skins were worn in winter, but we have no direct proof of it. These garments have the same weave

as the cloth worn by the Scots peasantry of to-day. Complete male costumes have been found in five different localities (Jutland); the weave, the cut, and the sewing are the same in all.

The female costume of the time is well represented by a find in an oak coffin from a tumulus in Borum-Eshöi, near Aarhus (Jutland). The headdress consisted of a fine and artistically woven net worn low on the back of the head and supported by a string which passed just above the forehead. The cloth jacket was made of a single piece, the neck-hole being a simple straight slit. The sleeves were cut bias and reached only to the elbows, so that the forearm, where ornaments were generally worn, was left bare. The margins were finished in buttonhole stitches, excepting the lower border, where two strips of cloth were added (Fig. 342).

FIG. 342. FEMALE COSTUME OF THE BRONZE AGE.

These woolen garments were found in an oak coffin in a tumulus at Borum Eschöi, Jutland, Denmark. Scale, $\frac{1}{12}$. After Montelius.

It would be difficult to say whether the skirt or petticoat (both of wool) was fastened outside the jacket; it probably was, so as to hide the unattractive lower border of the jacket. The skirt was made of a single piece of cloth, with the selvage at the top and bottom, and hung in loose folds from the waist, reaching the feet. Two woven belts ending in artistic tassels were found with the clothing. The cloth was usually dark brown to black, which indicates that the art of dyeing wool was known.

The principal ornaments worn by the women were a bronze band about the neck, a great bronze buckle on the belt (formerly supposed to be the central plate of a shield), spiral bracelets, a fibula, combs, and finger rings. To attempt to describe the various small tools and utensils of the Bronze Age would be to presume on the patience of the reader, but we may be permitted to give some

space to articles of adornment. Among these, bracelets were an important factor, especially beginning with the second epoch of the Age (Fig. 343). The wearer was not always content with a single example. In the Cave of Meyrannes (Gard) as many as six or eight bracelets were found on a single skeleton. The types are varied; most of them are open, and many are beautifully incised. Two very important finds of stone bracelets dating from the Bronze Age have been recorded, both in Allier. The material employed was a local schist. Bronze Age sepultures have yielded anklets. A hammered and richly ornamented bronze anklet was found on each tibia of a warrior whose skeleton was discovered in a sandpit at Champigny (Aube) in 1879. The anklets terminated at both ends in a grand spiral of twelve turns.

FIG. 343. MIDDLE BRONZE AGE GOLD BRACELETS FROM BOHEMIA.

Originals in the National Museum at Prague. Photograph by J. Schranil.

Torques, or solid metallic collars, appeared as early as the beginning of the Bronze Age. The metal is either plain or twisted, sometimes with the ends recurved. Bronze Age necklaces usually consisted of beads of amber, bronze, turquoise, or glass strung on a thread of wool.

Finger rings were not so common as were rings of larger dimensions. The latter were evidently sometimes strung on a metal wire. Their relatively great frequency leads quite logically also to the assumption that they were employed as a medium of exchange. Chains formed an important ornamental element and were no doubt widely used as belts, series of pendants adding to their effectiveness. Scandinavia excelled in workmanship of this kind.

Little need be said concerning needles of bronze. The eye was placed either near the summit or nearly midway. Pins occur in much greater number and variety. They are found in sepultures of both sexes but predominate in sepultures of the female. They vary much in size, the largest ones being used in the female coiffure

and to fasten garments about the neck and shoulders. The use of pins was much more general in central than in western Europe during the first two epochs of the Bronze Age. The form of the pinhead serves largely as a basis of classification. The wheel-shaped and spheroidal heads were common during the third and

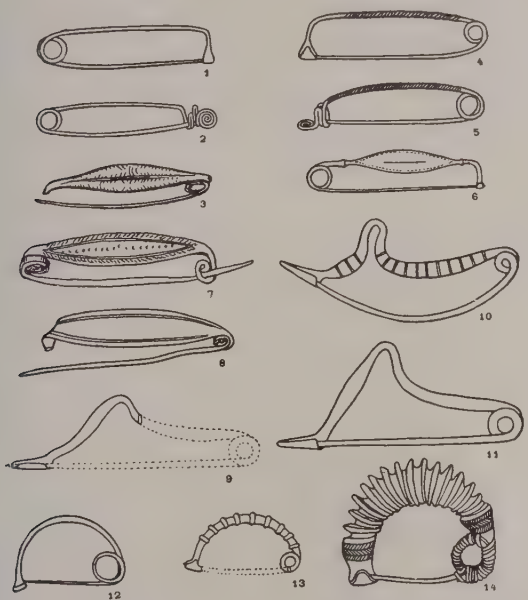


FIG. 344. VARIOUS TYPES OF BRONZE AGE SAFETY PINS OR FIBULAE.

Nos. 1, 2, and 3 are from Greece; Nos. 4, 5, 6, from Italy; No. 8, from Germany; Nos. 7, 9, 13, from France; Nos. 10, 11, from Sicily; and Nos. 12, 14, from Switzerland. Scale. No. 1, *ca.* $\frac{1}{6}$; Nos. 10, 11, *ca.* $\frac{1}{3}$; No. 12, *ca.* $\frac{1}{5}$; the rest *ca.* $\frac{2}{5}$.

fourth epochs. Frequently the heads end in the form of a shepherd's crook or in a simple ring. There is also an attractive series of so-called vasiform heads.

The evolution of the Bronze Age fibula or safety pin is an interesting subject for study (Fig. 344). One of the ancient types is still faithfully followed in the modern safety pin. The elements that go to make up a fibula are the arch or bow, the spring (unilateral or bilateral), and the pin. At the end of the bow opposite

the spring is the clasp, which serves as a protection for both pin and wearer. There is also a primitive early Scandinavian type in two pieces, the pin being separate from the bow (dating from Bronze II).

The terremare of Italy have yielded early types of the fibula dating from the Mycenæan Epoch II. These have a simple bow, plain or twisted, and a bow the body of which is flattened or leaf-shaped (a later type than the preceding). The fibula did not appear in Gaul till the beginning of the fourth epoch of the Bronze Age. By the close of the Bronze Age four types are recognizable in western Europe, the fiddle bow, the highly arched bow, the ribbed bow, and the serpentiform bow.

The toilet is a relatively ancient institution. As far back as the early Neolithic Period, use was made of bone combs, and it is probable that other material might have been employed in comb manufacture. Combs, not only of bronze, but also of bone, horn, ivory, and wood were in use during the Bronze Age. They are usually small and with but a single row of teeth. Bronze tweezers are often found associated with combs. It is safe, therefore, to assume that at least one of their uses was to remove superfluous hair. The mirror during the Bronze Age seems to have been unknown in Europe with the exception of Greece and Crete. The earliest mirrors discovered in France date from the second epoch of the Iron Age.

Before leaving the subject of personal adornment, some consideration should be given to the rôle played by metals other than bronze and by glass. Since gold was undoubtedly one of the first metals to attract man's attention, its abundance, especially during the first epoch of the Bronze Age, is by no means surprising. The principal sources of gold were Ireland, the Iberian peninsula, and Transylvania. The metal was, as it still is, well adapted for use in articles of personal adornment, such as beads, bracelets, collars, crescents, earrings, spiral rings, torques, etc. The spirals were doubtless employed in dressing the hair. Torques with the ends recurved were the fashion.

Gold, as well as silver, was also employed as an ornament for tools, utensils, and weapons. According to the *Iliad,* the socket of Hector's lance was incrusted with gold. Ceremonial vases and

utensils were often made wholly of gold or silver. Vases of gold have been extracted from Scandinavian peat bogs, and they occur less frequently in France. Gold plating was known to metal workers of the Bronze Age, especially in Scandinavia, Spain, Italy, and the Near East.

Silver and lead were employed to some extent from the beginning of the Bronze Age. Sardinia, as well as Spain, possesses an abundance of lead ore. Socketed axes of lead, evidently votive in character, have been found in England, France, Sweden, and Italy.

The making of glass is an Egyptian invention. The oldest examples date from the first dynasties. From Egypt the use of glass spread to other Mediterranean countries, reaching Spain and even the British Isles as early as the first epoch of the Bronze Age. Beads of glass and tubes representing a series of glass beads have been reported from Spain by the Siret brothers and from England by Sir John Evans. In each case the paste was similar, opaque and of a bluish or greenish color.

## Pottery

The ceramic art, since its inception in Neolithic times, has played a beneficent and important rôle. The Bronze Age potters of western Europe registered improvements over the work of their predecessors, but they remained to the last ignorant of the potter's wheel. In the eastern Mediterranean region, however, products of the wheel may be dated as far back as the end of the primitive Minoan Epoch (about 2300 B.C.).

In western Europe certain fairly well defined Bronze Age ceramic types are distinguishable (Fig. 345). An early type, well represented in Brittany, has four vertically placed handles (sometimes reduced to two). Most of these vases are unornamented, but some bear incised herringbone and other simple patterns. During the second and third epochs, a new technique, characteristic of the Bronze Age but derived from earlier models, appeared. The new feature consisted rather in the greater depth to which the incised patterns penetrated; these patterns were sometimes stamped in. Pottery fragments with deeply incised or stamped patterns have been found in many parts of France, being especially abundant at

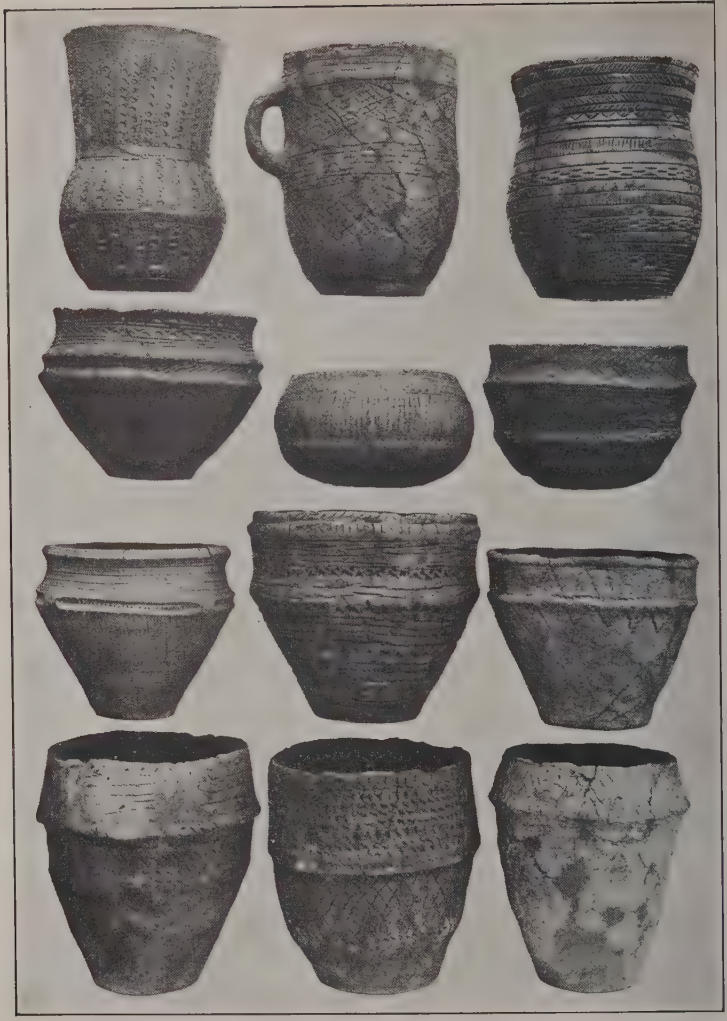

FIG. 345. BRONZE AGE SEPULCHRAL POTTERY FROM THE BRITISH ISLES.

The pieces in the upper row are beakers. Those in the next two rows are food vessels which succeeded the taller and better made beakers and are found in considerable numbers in Ireland as well as in Britain. The majority occur with unburnt bodies in round barrows. The pieces in the bottom row are cinerary urns which were developed somewhat later as a class than the beakers and food vessels. Their appearance was foreshadowed, however, by the two on the right in the next row above. Photograph from the British Museum.

Bois-du-Roc (Charente). Fluted and mammillated patterns appear in the third epoch, the latter occurring abundantly in Alsace, Bavaria, Silesia, and neighboring regions.

The pottery of the fourth epoch is especially well represented in collections from the Swiss and French lake villages. The pile dwellers made use of enormous vessels for storing supplies; some of these containers measured a meter (39.4 inches) in diameter. The paste was coarse and blackish to red in color. The series of smaller vases from the pile villages present a variety of forms, the dominant decorative motive consisting of a series of horizontal grooves. The presence of perforated vessels points to a knowledge of cheese making. A very common ceramic product of the Bronze Age is the spindle whorl.

One of the curious and interesting ceramic products of the fourth epoch is what Déchelette considers to be the nursing bottle, a vessel with circular aperture for filling, but with a horizontally elongate, ovoid body. One extremity of the body is provided with a perforation through which the vessel may be emptied. The bottom is either plain or provided with four short legs.

## Commerce

The lengthening of the radius of the circle of man's needs received a wonderful impetus with the discovery of metals. These in themselves not only became an article of commerce, but also soon served as a means of facilitating commerce in products of every known kind. The relics found in Bronze Age deposits testify to a wide use of pack and draft animals. The appearance of the wheel as an ornament, and with objects of a votive or ceremonial character, leads to the conclusion that it likewise served other and more practical purposes.

The frequency with which votive ships and votive chariots are met with during the Bronze Age is particularly impressive. The ship and the wheeled land vehicle took the burden from man's back and gave rest to his feet. There is something symbolic about the wheel; it is shaped like the sun, that source of heat, light, power, and even life, as well as the embodiment of motion, since it travels far by night and by day and is never tired. No wonder that even

as early as the Bronze Age we find the Cult of the Sun associated with the wheel and the horse.

If the sun had his chariot, he likewise had his boat, by which he traveled at night in order to be at his accustomed place at dawn. Among Scandinavian petroglyphs there are many which represent the association of the sun's disk with barks (see Fig. 322).

Another great aid to commerce during the Bronze Age was a medium of exchange, usually in the form of metal rings or of axes.

FIG. 346. BRONZE AGE BRIDLE BITS OF BRONZE AND OF BONE AND HORN FROM THE PILE VILLAGE OF CORCELETTES, LAKE NEUCHÂTEL, SWITZERLAND.

Photograph by Tschumi.

Tin, without which there could have been no Bronze Age, occurs in nature in only a comparatively few localities. Yet its dissemination in foundry sites all over Europe not long after the discovery of its value is a well established fact. There is ample evidence of a considerable traffic in copper ingots among countries bordering on the Mediterranean. Other highly localized products, such as amber and turquoise, found their way to various parts of Europe even during the Neolithic Period, so that by the beginning of the Bronze Age Europe was already a unit, industrially speaking.

Salt was another product in which there was extensive barter during the Bronze Age. Localities rich in salt also became warehouse centers for food products habitually preserved in salt. A bronze ax of the winged type and several handles of wood for axes of the same type were found in salt mines near Salzburg, Austria.

Bronze Age traffic in finished products such as tools, weapons, ornaments, etc., was by no means negligible. Italian and Scandinavian types are found in central and western Europe; a typical Hungarian bronze sword was found in the department of Ain (France); Scandinavian fibulae and bronze vases are encountered from time to time in Swiss pile villages.

That Bronze Age culture could not have originated independently in the north is clear from the fact that the north possessed neither copper nor tin; hence, the culture was an imported one. No one now believes it to have come from Russia. Müller and Montelius do not believe it could have come from western Europe (England, France, or Spain); according to them, tin was not mined in Cornwall at so early a period. The importation came through commercial relations with the south, not by an invasion of a whole people, but by the introduction of southern wares into the north. The Stone Age graves of the North contain the remains of the ancestors of the present Scandinavian population, as shown by authorities in physical anthropology; moreover, the graves of the first epoch of the Bronze Age are precisely like those of the last epoch of the Stone Age.

Evidences of an extensive and early traffic in amber have been known to historians for many years. Alexander von Humboldt mentioned it (1847), but he had no idea that it reached back to 1200 B.C. and was the direct cause of the early development of civilization in the north. Nilsson was the first (1862) to pronounce in favor of this view; he was also impressed by the similarity of the northern Bronze Age culture to that of the south, and attempted to explain it by supposing that southern Scandinavia had been colonized by the seafaring Phœnicians, which, however, was not the case.

The magnetic character of amber was noticed by Thales of Miletus as early as 600 B.C. and also by the naturalists of the fourth century B.C., Plato, Aristotle, and Theophrastus. Isodorus

Siculus, Strabo, and other writers mention this quality, but never refer to amber as costly or as used for ornament. Virgil and Ovid speak of it as material for ornament. According to Pliny, the use of amber in the manufacture of art objects was quite general. Amber was then the mode; it was attractive in color and was used as a means of healing. It was used during the Mycenæan period in Greece, as Schliemann found four hundred amber beads while excavating the Acropolis at Mycenae. These were tested and found

FIG. 347. AMBER NECKLACE FROM A BRONZE AGE BARROW AT LAKE, WILTSHIRE, ENGLAND.

Scale, *ca.* ½. After Thurnam.

to be amber from Prussia or Jutland. Amber was also found at many other sites in Greece belonging to a period equally remote.

The two great sources of supply were (and still are) Jutland and the Prussian coast. During the Stone and Bronze Ages most of the amber came from Jutland; since that time Prussia has furnished the greater quantity. Amber from Jutland found its way to Great Britain by boat across the North Sea even before the introduction of Bronze culture; it is still more frequently encountered in burials of the Bronze Age.

R. C. Hoare describes a remarkable amber necklace found with

a skeleton in a tumulus or barrow at Lake (Wiltshire) and now preserved in the British Museum (Fig. 347). It is composed of eight perforated amber plates and numerous amber beads. The plates vary in size, the largest having several perforations and the smallest (at the ends) only one or two; the beads were strung so as to fill alternating spaces about equal in area to the plates. A necklace similar in shape but containing beads of both amber and jet was found in a barrow at Kingston Deverill (Wiltshire). The specimen

FIG. 348. BRONZE VESSELS MADE IN ITALY AND FOUND IN THE BRITISH ISLES.

The extent of Bronze Age commerce is indicated by this Italian cauldron (left) found in the Thames near Battersea, and the bucket-shaped urn (right) found in the cache at Dowris, Ireland (see Fig. 337). Photograph from the British Museum.

from Lake belongs to the same type as the jet necklace from Melfort (Argyllshire), which is known to belong to the Bronze Age.

The principal routes by which traffic in amber spread over Europe were: (1) by way of the Vistula and the Dniester to the Black Sea; (2) the Elbe-Moldau-Danube route; (3) North Sea to the Mediterranean by way of the Rhine and the Rhone; and (4) the maritime route by way of the North Sea, English Channel, Atlantic Ocean, and the Straits of Gibraltar.

According to Montelius, who made a special study of prehistoric commerce, trade routes connecting the Baltic with the Mediterranean began to be used about 2500 B.C. Many bronze weapons and vessels of Italian workmanship have been found in northern Germany (Mecklenburg) and Scandinavia (Zealand, Moen, Jut-

land, and southern Sweden). Fibulae of Italian and La Tène types have been found in Sweden. Northern bronzes likewise found their way into the south, but not to the same extent. The excess of southern bronzes found in northern latitudes, was no doubt, given in exchange for amber.

FIG. 349. PURSE OF BRONZE FROM THE PILE VILLAGE OF WOLLISHOFEN, SWITZERLAND.

The twisted bar is the purse; the money consists of the bronze rings which it carries. Actual size. Redrawn from Hierli.

The Bronze Age culture complex was such as to involve commercial relations on a hitherto undreamed-of scale (Fig. 348). To meet the needs arising from this growth, special media of exchange were invented; bronze itself furnished a very satisfactory material for the purpose. A remarkable purse, partly filled with money, was found in the Bronze Age pile village of Wollishofen, near Zurich (Fig. 349). The purse consists of a twisted bar of bronze, 5 millimeters (0.2 inch) in diameter, bent to form a ring with the loose ends overlapping and held together by a circular clasp. The money in the purse consists of eight small bronze rings strung on the twisted bar and secured against loss by the clasp. A Bronze Age gold bracelet with similar ring money, preserved in the British Museum, was found at Ely (Cambridgeshire). Molds for casting ring money have been reported from various parts of Europe, especially Switzerland.

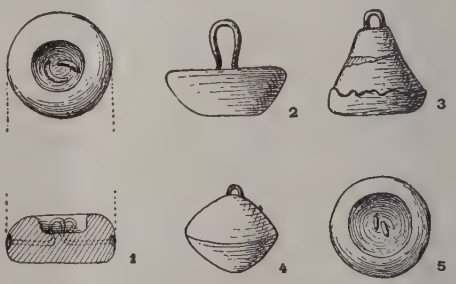


FIG. 350. BRONZE AGE WEIGHTS FROM SWISS PILE VILLAGES.

These weights testify to a more or less complex system of commercial interchange. Scale, ½. After Forrer.

A commercial complex such as existed in Europe during the

Bronze Age implies, not only trade routes, but also such aids as systems of weights and measures. These systems no doubt differed in sections remote the one from the other. That commerce can be carried on without a uniform system of weights and measures, however, is evidenced by the fact that Britons and Americans still cling to antiquated systems. A bas-relief found at Sakkarah, dating from the fifth dynasty, represents a balance. The balance is likewise mentioned in the Homeric poems. Certain weights of lead and tin found in Swiss pile villages must have been used in connection with a balance (Fig. 350).

### Religion and Art

The Neolithic Period and the Bronze Age in western Europe may both be referred to as dark ages in the realm of art. There is nothing to indicate that the classic period of Paleolithic art had ever existed in the same territory. Egypt and the eastern Mediterranean region fared better, especially during the Bronze Age, their contributions to architecture and sculpture being particularly important.

In all ages there seems to have been an intimate relation between art and religion. The prayer of the Paleolithic hunter was for an abundance of game and success in the chase. The Neolithic herdsman and tiller of the soil had a different set of problems to face. His interest in, and dependence on, wild game was a matter of minor concern. His crops and domestic animals meant nearly everything to him. In addition, grazing and agriculture meant everything to his herds. In the last analysis, the really indispensable factor was the sun, master of the seasons as well as of the elements. The Bronze Age races were primarily heirs of Neolithic culture in so far as art is concerned. Their art was largely the handmaid of the cult of the time, the central figure of which was the sun. The moon and fire were objects of veneration, but these two partake of the attributes of the sun.

A discovery of capital importance bearing on sun worship was the small six-wheeled bronze chariot bearing a horse-drawn gilded disk of the sun which was found in a peat bog at Trundholm (Zealand), Denmark, in 1902 (Fig. 351). The disk is vertical in position; its two faces are slightly convex, and the central portion of

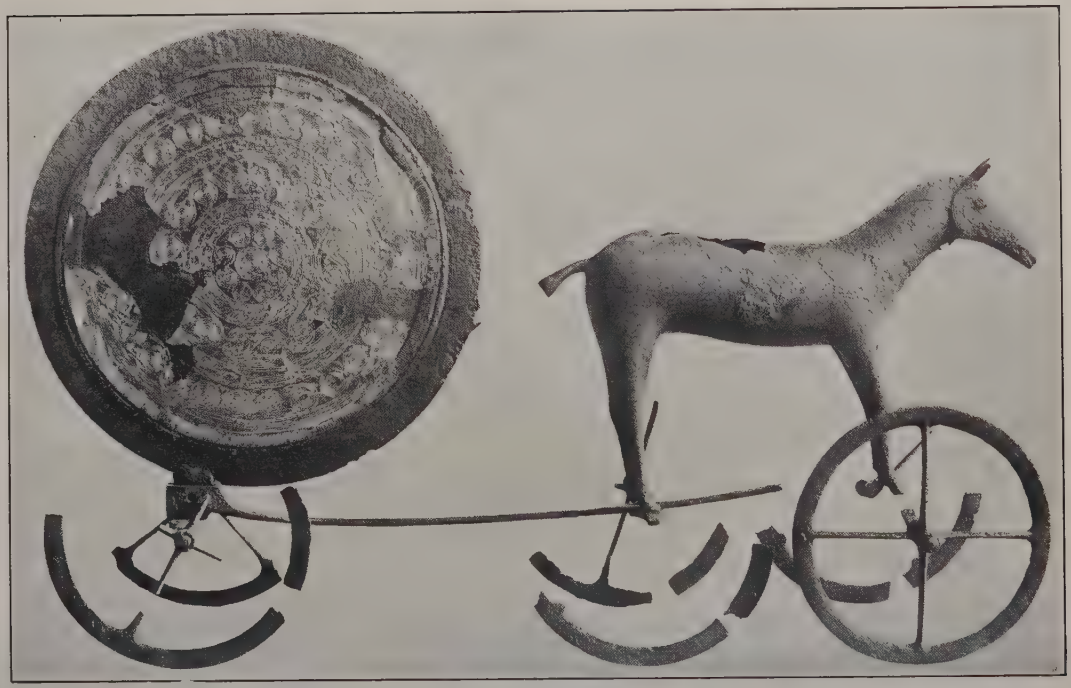

FIG. 351. BRONZE SUN CHARIOT FROM TRUNDHOLM, DENMARK.

Scale, *ca.* $\frac{1}{3}$. After Müller.

the right face is covered with leaf gold, stamped and engraved. The horse, a hollow casting with resin-incrusted eyes, is provided with a collar; for although borne by the chariot, its function is to symbolize movement which in turn is transmitted to both sun and chariot. The Trundholm chariot belongs to the second (or the beginning of the third) epoch of the Bronze Age in Scandinavia, about 1300 B.C., according to Montelius.

Later discoveries of a similar nature have been made at Helsinborg (Scania), including two horses, fragments of a chariot and of a sun's disk, as well as various other objects of bronze dating from the second epoch. Hence there is no longer any doubt as to the meaning of the various more or less highly ornamented bronze disks found in other parts of western Europe. Some authors see even in the circular cromlech a symbol of sun worship, a view which is strengthened by the finding of a cromlech of small stones under the eastern extremity of the great tumulus of Manélud (Morbihan); on each of the stones forming the cromlech there was found the skull of a horse.

The sun disappears in the west to reappear in the east. Its mysterious course was supposed to be over, or by means of, the ocean; for this, a boat rather than a wheeled chariot would the better meets its needs. In the cult of the sun, the bark plays a rôle analogous to that of the chariot. Evidence of this is afforded by numerous petroglyphs representing the sun bark, that is to say, figures of the bark associated, or in direct connection, with figures of the sun (see Fig. 322). Sun-bark petroglyphs are particularly abundant in Scandinavia, where interest in the nightly course of the sun is heightened by the alternating laggard, fearsomely long nights of winter and the almost complete replacement of night by twilight in summer. Even more important are the small gold figurines in the form of a bark, the hull of which is decorated with figures of the sun's disk. At Nors (Jutland) a hundred gold figurines of the sun bark were found in a pottery vase which had been buried and covered by a flat stone.

Sometimes the prow and the stern of votive Scandinavian barks are so fashioned as to represent the head and neck of the swan. This is not surprising in view of the rôle played by the swan in ancient mythology, including Greco-Roman. Moreover, nothing

could better symbolize movement by water than an aquatic bird, and no aquatic bird better than the swan. To the primitive mind the wheeled chariot would be of no avail unless drawn by a living creature, and the living creature which best served this purpose was the horse. In the same manner the swan gave life and motion to the otherwise lifeless boat. When Lohengrin came by water to the rescue of Elsa, it was by means of a swan-drawn craft.

The frequent presence of the sun bark on the Bronze Age razors is not mystifying when viewed in the light of mythology. Among the Aryans the sun and fire god was also the high priest of medicine and surgery. The first razors were surgical instruments, and those ornamented with the sun bark presumably belonged to the medicine men. The razor handle often terminates in the head and neck of a swan or horse, both being sun symbols, or in the even more obvious disk with spokes.

FIG. 352. BRONZE SITULA FROM SIEM, DENMARK.

The zonal decoration is a sun bark with swan's heads at the prow and stern. The sun's journey by night (sunset to sunrise) was imagined to be by means of a swan-drawn boat. Scale, $\frac{1}{3}$. After Undset.

The sepulture of a medicine man was found in a tumulus at Hvidegard, near Copenhagen. Lying next to the bones was a small leather box containing the following: a piece of an amber bead, the tip of a serpent's tail, a perforated shell from the Mediterranean, the lower jaw of a squirrel, the claw of a bird, a few small stones, a flint javelin point, a pair of small tweezers, two bronze razors, etc. The two razors, wrapped carefully in leather, were each ornamented with the head of a horse. Sophus Müller has found the horsehead motive as an ornament on tweezers which likewise no doubt belonged in the kit of some medicine man.

Sun worship is easily traceable in the decoration on gold vases and cups. In this connection there should be mentioned the bronze

situla discovered at Lavindsgaard, containing eleven gold cups, each ornamented with repoussé concentric circles. The situla itself likewise bore a characteristic sun motive. Several dozen gold vases found in Denmark are to be classed in the same category.

Stylistic sun symbols are dominant in the decoration of the grand repoussé bronze situlae and vases found in various parts of Europe. The sun's disk is by preference represented by a series of concentric circles or a wheel with spokes, and often alternates with the swan symbol to form zonal decorations. A fine example from Siem, Denmark, in which the bark is also recognizable, was published by Undset (Fig. 352). Another example, somewhat more stylistic, has been reported from Hungary by Hampel. In each the sun bark is seen in section with swan heads at prow and stern; the sun's disk rests on the semicircular bottom of the bark. Similar representations are found on vases, helmets, shields, and belts.

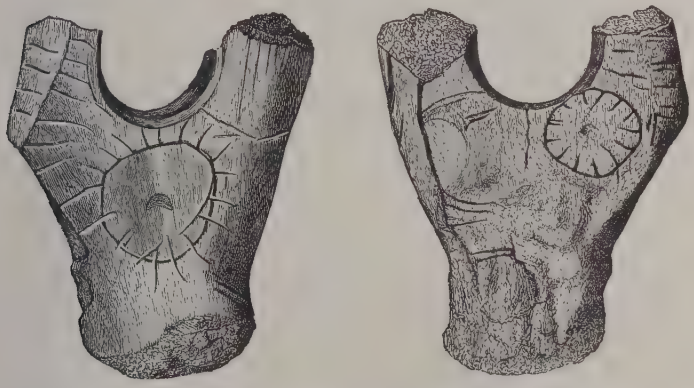

FIG. 353. UPPER PALEOLITHIC SUN SYMBOLS ON A BATON OF REINDEER HORN FROM THE CAVE OF GOURDAN, HAUTE-GARONNE, FRANCE.

After Piette.

It is possible that sun worship existed in Europe prior to the Bronze Age. Piette thought he found evidence of it during the Azilian Epoch and perhaps even earlier. On a baton of reindeer horn from the Cave of Gourdan he found two figures which he interpreted as sun symbols—a spot surrounded by a circle (Fig. 353). In one, the radiating lines extended outward from the cir-

cumference, in the other, inward. Piette also found at Gourdan a thin disk of bone with a central hole from which incised lines radiated toward the circumference. Massenat reported an analogous bone disk from Laugerie-Basse. Among the figures appearing on the painted pebbles from Mas d'Azil, the circle with central spot recurs frequently.

Bronze situlae are frequently mounted on chariots, and some of these are associated with figures of the swan. The votive chariot found at Skallerup, Denmark, is a good example. The two recurved bars at each end of the framework of the chariot terminate in figures of the swan. According to Montelius, this chariot belongs to the third epoch of the Bronze Age.

Déchelette notes the presence of prehistoric votive offerings in connection with the thermal springs of France and concludes that a cult of water-supply sources, especially of thermal waters, must have existed. Chipped flints have been found at many important sources, including Vichy, Bourbonne, and Saint-Honoré. At Saint-Moritz in the valley of the Engadine, while repairing the orifice of the ancient source, workmen uncovered wooden conduits. Two well preserved bronze swords planted upright were found at the base of these conduits. In close proximity to the swords were a poniard, a pin, and a fragment of another sword. There is evidence of a cult of rivers, lakes, and springs among barbaric races in various parts of the world.

Before passing from the cults of the Bronze Age, a word should be said concerning the swastika and other symbols derived from the wheel, or the sun's disk, for the two blend often into one. The suggestion of movement is even better expressed by the swastika than by the wheel; even the direction of the movement is indicated. It is a perfect symbol of rotation. The wide diffusion of the swastika and its variants over both hemispheres is a fact that should be noted even if it cannot be fully explained. Among the oldest known examples are those on spindle whorls from the second city of Hissarlik. The swastika had scarcely gained a foothold in central and western Europe until the first epoch of the Iron Age.

Traces of a cult of the ox are also to be found in northern and western Europe (Fig. 354). At Bythin, Posen, a cache was uncovered containing the remains of a pair of oxen harnessed to the same

yoke and associated with six flat copper axes belonging to the first phase of the Bronze Age. Bythin served to recall a much earlier discovery (1841) of a cache at Châtillon-sur-Seiche (Ille-et-Vilaine) containing two bronze oxen, also four bronze axes of the *bords-*

FIG. 354. POTTERY CRESCENTS OF THE BRONZE AGE FROM THE PILE VILLAGE OF CORCELETTES, LAKE NEUCHÂTEL, SWITZERLAND.

By reason of the two protuberances suggestive of horns, crescents of this sort have been associated with the cult of the ox. Photograph by Tschumi.

*droits* type, a lance head, a javelin point, a razor, and a small ingot. Much more numerous are the plastic representations of the horns alone in pairs. Examples of this sort, both in stone and pottery, abound especially in Bronze Age lake villages. They have been reported from Auvernier, Chevroux, Concise, Cortaillod, Möringen, Nidau, and Wollishofen. They are even more abundant in the

Ægean region, occurring in large numbers at Cnossos, Gournia, and Hagia Triada. According to Evans, they represent the head of the sacrificial ox and are not to be classed with the Egyptian crescent-shaped headrests.

The region of the Ægean has also yielded many examples of the ox head associated with the votive ax, which takes the place of the sun's disk between the horns (Fig. 355). The typical Ægean votive ax is two-bladed (bipennis). The ax is likewise associated with such sun symbols as the swan, horse, and swastika. The votive ax is found sculptured on some of the megalithic monuments in Brittany and on the walls of certain artificial caves of the Marne.

FIG. 355. AN ÆGEAN DECORATIVE MOTIVE ASSOCIATING THE VOTIVE AX WITH THE HEAD OF THE OX.

From a Mycenæan vase, Old Salamis, Cyprus. After Evans.

Petroglyphs were an important factor in Bronze Age art, especially in Liguria and Scandinavia. Clarence Bicknell estimates the number of petroglyphs on the heights north of Ventimiglia at about seven thousand. They are cut into the rock by means of a dull pointed hammer. Figures of Bovidae predominate. Some are attached to plows, some are represented as at liberty. In some cases the head alone (front view) is represented. There is an important series representing various tools and weapons—swords, poniard-axes, lances, plows, spades, sickles, etc. A third group is composed largely of geometric figures often difficult to interpret. The human form occurs in association with tools and weapons. Bicknell has counted more than one hundred laborers holding plows. In view of the presence of the poniard-ax, these Ligurian petroglyphs are referred to the first epoch of the Bronze Age.

Scandinavia, especially Sweden, is rich in petroglyphs. Attention has already been called to petroglyphs of the sun bark. The laborer behind his ox-drawn plow is likewise found in the north, a good example being recorded from Bohuslän, Sweden. Another petroglyph from Bohuslän, representing a warrior with sword and shield, belongs to a late phase of the Bronze Age (Fig. 356).

Bronze Age art is revealed in sepulture ornamentation. A fine Scandinavian example is the tomb at Kivik, a fishing village on the eastern coast of Scania (Fig. 357). The burial chamber, 4 meters (13.1 feet) long by more than a meter wide, was discovered in 1750 when the mound over it was opened. The inner surfaces of the stones forming the chamber bear various engraved figures —men, horses, a chariot, axes, etc.

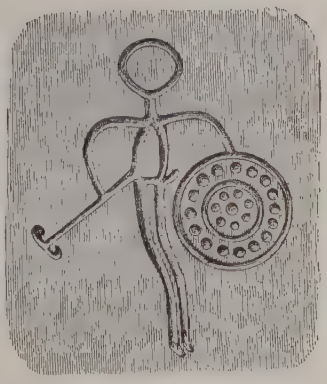

FIG. 356. LATE BRONZE AGE PETROGLYPH REPRESENTING A WARRIOR WITH SHIELD, FROM BOHUSLÄN, SWEDEN.

After Montelius.

Neolithic sculptors left some important examples of their art in the form of grave headstones, known as statue menhirs. The best known examples are from southern France (Aveyron, Gard, Hérault, and Tarn). Stones sculptured in the same manner, but belonging to the first epoch of the Bronze Age, are reported from Italy, Spain, and Portugal.

FIG. 357. ONE OF THE ENGRAVED STONES FROM THE BRONZE AGE TOMB AT KIVIK, SCANIA.

After Montelius.

At I Bocciari near Spezzia, province of Genoa, a farmer had the good fortune to uncover in 1905 a series of nine statue menhirs. Eight were still standing side by side in an erect position (only one had fallen) under a low tumulus. Some represent the female, others the male; the latter in each case has as a distinguishing mark a short dagger of a type which characterizes the first epoch of the Bronze Age. The sculptured flagstones

of schist found in the district of Béja, Portugal, are not menhirs in the strict sense, for they served as covers for sepultures; they are referable by their contents to an early phase of the Bronze Age. The sculptured flagstone found at Defesa (Estramadura), Spain, is ornamented with the figures of a sword and an ax.

### Sepultures

Sepultures of the Bronze Age in Switzerland were made the subject of special study both by Heierli and Viollier. Heierli observes that while Neolithic burials were inhumations in stone cists with body flexed, there appeared at the close of the period in German Switzerland tumuli with incinerations. Viollier notes that at the close of the Neolithic Period in Switzerland there appeared a new form of sepulture; the tumulus was but rarely employed throughout the Bronze Age. Relatively rare during the first part of the Bronze Age, incineration was frequently employed toward its close. He does not know how the pile dwellers disposed of their dead.

Forel has recently published an important monograph on the Bronze Age necropolis at Boiron near Morges, containing especially tombs without tumuli and belonging, evidently, to the fourth epoch of the Bronze Age. Both incineration and inhumation rites were employed. In his *Protohelvètes,* Gross describes the cist tomb of Auvernier, one of the first Bronze Age sepultures to be recorded.

Before his death in 1914 Déchelette had made considerable progress in the classification of Bronze Age sepultures in France, where copper was introduced first of all in the south and west. Among the many dolmenic sepultures of the first epoch of the Bronze Age, that of the dolmen of Liquisse (Aveyron) is typical. In it were found two pins with trefoil head, two tattooing instruments (lozenge-shaped with double point), a small poniard with rivets, small rings, a steatite bead, beads of tufa, bone, amber, and shell, divers pendants, and finely chipped arrowheads of flint.

An important discovery was made in 1908 by Baron Blanc and H. Müller of two flexed skeletons at Fontaine-le-Puis (Savoie). With one there were only Neolithic objects; the objects associated with the other skeleton included a flat ax, a small dagger with

rivets, a point, and a pendant, all of pure copper; three polished stone axes, numerous flint arrowheads without barbs, flint blades, a shell, and teeth of the wild boar.

Many of the tumuli in eastern France date from the first and second epochs of the Bronze Age. In the commune of La Chapelle (Jura) Piroutet recently explored a tumulus and found a cist of dry masonry containing the extended skeleton of a male. At the belt level lay a poniard with rivets; on the breast, a bronze ax of the *bords-droits* type; and a little nearer the head, a pin and a golden spiral. The sepultures in the tumulus of Clucy, canton of Salins (Jura), belong to a somewhat earlier phase of the Bronze Age. The second epoch of the Bronze Age is represented by the inhumations in the Buissières Cave at Meyrannes (Gard), where each one of the dozen skeletons bore from six to eight bronze bracelets.

Brittany, where Neolithic races left such important sepulchral monuments, contains also the most numerous and interesting sepultures of the Bronze Age in France. Two types with central chamber are recognizable, one rectangular in plan with flat covering stone, and the other circular in plan with vaulted roofing. In each case the supporting walls are of dry masonry instead of the megaliths set on end employed by the Neolithic builders.

These sepultures belong for the most part to the second epoch of the Bronze Age. The objects buried with the dead are similar to those of the Mediterranean littoral. Stone is associated with both copper and bronze, metal still being rare. Flint was still used for arrowheads, which were chipped with a degree of skill rarely witnessed in Neolithic times. Inhumation was the dominant mode of sepulture in France during the first and second epochs of the Bronze Age, with the exception of Brittany, where incineration was in the ascendant.

In France inhumation continued to be the rule during the third epoch of the Bronze Age. The sepulture of Courtevant in the commune of Barbuise (Aube) serves as a type. The walls of the tomb were built of dry masonry. The skeleton of a warrior lay extended with head to the west. The sword lying between the leg bones of the warrior was left there in its bronze-mounted wooden sheath; at the right hand was a bronze ring, and at the hip

a bronze knife; a bronze pin rested on the clavicle, and two cylindrical beads of sheet bronze were lying on the right femur. The nonmetallic objects included the canine tooth of a wild boar (on the breast) and numerous fragments of black pottery at the feet.

Sepultures of this epoch containing swords are rare; Brunner has reported one from a tumulus at Staadorf (Upper Palatinate). There are, however, many containing characteristic pins, bracelets,

FIG. 358. ENEOLITHIC SEPULTURE FOUND AT BUBENAC, NEAR PRAGUE, BOHEMIA. The arms and legs are flexed. Pottery vessels are found lying about the head. Photograph by Jira.

and other objects of apparel; the contents of these bear a remarkable similarity on both sides of the Rhine valley and in eastern France.

Sepultures of the fourth epoch of the Bronze Age are distinguishable by their cultural contents and the predominance of incineration over inhumation. They are by no means rare in eastern France. The most important necropoli of central France are composed of the so-called flat tombs, exemplified by the cemeteries of Pougues-les-Eaux and Arthel (Nièvre) and Dompierre

(Allier). The so-called *Urnenfelder* of Germany are typical cemeteries of this epoch (Fig. 358).

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# CHAPTER XIV

## THE IRON AGE

The Iron Age in central and western Europe is divided into two epochs, known as *Hallstatt* and *La Tène* (or *Latene*). The first of these, the Hallstatt, corresponds roughly with *Dipylon* and archaic periods in Greece; the Epoch of La Tène began shortly before classic Greek art reached its apogee. The Hallstatt Epoch in France is synchronous with the late Celtic epoch, the La Tène Epoch with Gaulois culture. The first epoch of the Iron Age in Britain, also called Late Keltic, is synchronous with the Epoch of La Tène on the Continent.

A predynastic tomb at El Gerzeh, explored by the British School of Archeology in Egypt, contained a necklace consisting of beads of agate, cornelian, gold, and iron. The same sepulture contained a harpoon of copper. Gowland's analysis of the iron beads disclosed the fact that the metal employed was not native ore but the result of a reduction process. The necklace from El Gerzeh was not intrusive, since the tomb had been intact up to the time of the exploration by the British School. This isolated discovery does not suffice to establish the presence of an Age of Iron in predynastic Egypt. The early dynasties do not reveal the use of iron. In the long tribute lists of the eighteenth dynasty (1500 B.C.), examined by Hall, iron is nowhere mentioned. During the nineteenth dynasty (about 1250 B.C.) Hall finds mention of iron in a religious text.

The Iron Age seems to have had its beginning in the valleys of the Euphrates and Tigris at about the same time as in Egypt (*ca.* 1300 to 1200 B.C.). The discovery of an enormous cache of iron was made prior to 1867 by Victor Place in a part of the ensemble forming the ruins of the palace of Khorsabad, near ancient Nineveh. The hidden stock consisted for the most part of shuttle-shaped ingots each weighing anywhere between 4 and 20 kilograms (8.8

and 44 pounds). Each ingot was perforated for suspension near one end. An iron ingot of similar shape and pierced near one end, a gift of A. Merwin to the Peabody Museum of Yale University, was found at Mosul, Assyria (Fig. 359).

Crete was an important early center for trade in iron; the metal was known there as early as 1100 B.C. In Greece the first epoch of the Iron Age corresponds with the Dipylon Epoch (1200–800 B.C.), which was characterized by a rectilinear geometric style in art. The epoch derives its name from a necropolis known as Dipylon (double gate) near one of the gates of Athens. Dipylon tombs resemble in many respects those of the early Hallstatt Epoch

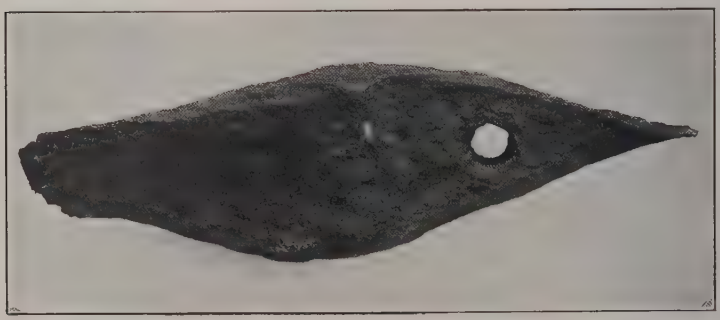

FIG. 359. IRON INGOT FROM MOSUL, ASSYRIA.
Scale, *ca.* $\frac{3}{10}$. Yale University Collection. Photograph by the author.

in western Europe. In both one finds a juxtaposition of incinerations and inhumations.

The ceramic ornamentation of the Dipylon Epoch is geometric, differing in this respect widely from the graceful Mycenæan style. Meanders, triangles, zigzags, and symbols derived from the swastika and wheel predominate. Representations of animals, including the wild goat, horse, water bird, and man, do not escape the stylistic tendency. The Dipylon style made itself felt also in the Danube valley and as far west as Gaul, judging by ceramic examples dating from the late Bronze and early Iron Ages. The main difference is in technique, the brush being still unknown in these regions.

The beginning of the Iron Age in Italy is placed at about

1000 B.C. To the Neolithic and Bronze Age populations was added new blood, including Umbrian, Greek, and especially Etruscan. Montelius divides the period from 1000 to 500 B.C. into six epochs: two proto-Etruscan and four Etruscan. The proto-Etruscan is synchronous with the first Villanovan phase of northern Italy. Throughout the proto-Etruscan the ceramic ornamentation remains geometric. The necropoli of Corneto and Vulci belong to the proto-Etruscan phases, the *tomba del Guerriero* at Corneto being a good example of the second phase. With the first and second Etruscan phases, about 700–600 B.C., Ionian and Punic influences begin to be felt. The sepultures are especially rich, among the better known being the Regulini-Galassi at Cervetri, the tomb known as the Cave of Isis at Vulci, the *tomba del Duce* at Vetulonia, the Bernardini tomb at Preneste, and the first sepultures with chariots in southern Germany, Switzerland, and eastern Gaul.

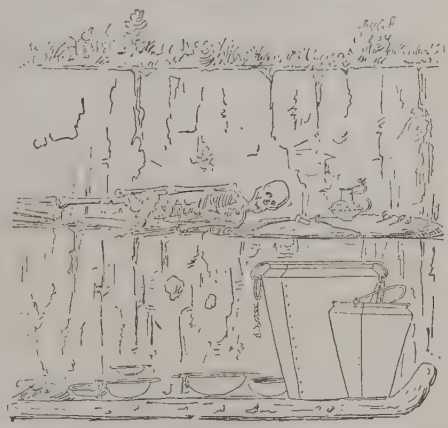

FIG. 360. INHUMATION TOMB SUPERPOSED ON AN INCINERATION TOMB AT HALLSTATT, AUSTRIA.

The rite of incineration, which dominated the burials of the early Hallstatt Epoch, changed to that of inhumation before the end of the period. After Hoernes.

Villanovan culture derives its name from the proto-historic cemetery at Villanova, 8 kilometers (5 meters) east of Bologna. The cemetery yielded 179 incineration sepultures and fourteen skeletons. A much greater cemetery was explored at Marzabotto, southwest of Bologna, beginning in 1869. A study of the sepultures (more than two thousand) proves that Bologna was founded by the Umbrians toward the close of the Bronze Age. The sepultures of Bologna antedating the occupation by the Gauls belong to a period which may be divided into four epochs: (1) Benacci I (1000–900 B.C.), incineration tombs, pottery with incised decora-

tion; (2) Benacci II (900–750 B.C.), incineration tombs, pottery with stamped decoration; (3) Arnoaldi (750–550 B.C.), incineration tombs, stamped decoration, Greek vases still rare; (4) La Certosa or Etruscan Epoch (550–400 B.C.), pit burials in wooden coffins, also incineration tombs, so-called Certosa fibulae, Greek vases with black figures and red figures.

An important necropolis dating from the first epoch of the Iron Age, known as Bordes-sur-Lez, is situated in the valley of the Riberot (Ariège). The collection gathered there by the Abbé Cau-Durban is in the museum of Saint-Remo, Toulouse. It includes many pottery urns that were employed as containers for the incinerated remains of the dead; also various objects of bronze and iron.

Fig. 361. Bronze situla of the Hallstatt epoch, from Hallstatt.

Scale, $\frac{1}{6}$. After von Sacken.

### The Hallstatt Epoch

The first epoch of the Iron Age in central and western Europe is known as the Hallstatt Epoch (900–500 B.C.). Hallstatt culture is traceable over an extensive territory from Hungary to Spain and Portugal. Its influence was felt but little in the British Isles, northern Germany, and Scandinavia, where the Bronze Age may be said to have lasted till about 500 B.C.

*Sepultures.*—The cemetery of Hallstatt is situated in the Austrian Salzkammergut, near important prehistoric salt mines. It was discovered in 1846. The first exploration was by Ramsauer on behalf of the Vienna museum and lasted until 1864. Of the

993 sepultures uncovered during this period, 525 were inhumations, 455 complete incinerations, and 13 partial incinerations. From 1871 to 1876 explorations on behalf of the museum at Lintz uncovered 130 sepultures. In all some three thousand tombs have been explored at Hallstatt. Various authors have published papers on the collections from this site, the most thorough study being by Hoernes of Vienna, who states that incineration was the dominant rite at the beginning, but that inhumation led by the close of the epoch (Fig. 360).

The skeletons for the most part have an east-west orientation and lie either on the back or the side. Sometimes two and even three or four skeletons were placed in the same sepulture, presumably at one time. Incineration sepultures likewise often contain the remains of more than one individual. There are cases where the two rites are represented in the same tomb.

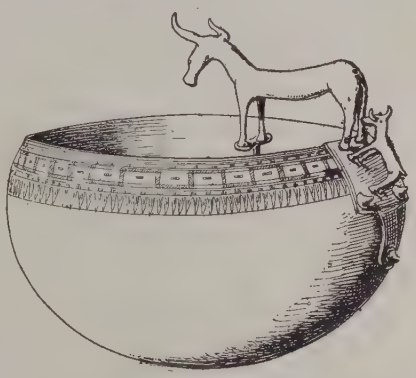

FIG. 362. BRONZE BASIN OF THE HALLSTATT EPOCH, FROM HALLSTATT.

The basin has an engraved margin and bears relief figures of a cow and a calf. After von Sacken.

Grave goods from Hallstatt comprise a large and varied assortment. Of the nearly six thousand specimens collected by Ramsauer, 3,574 are of bronze, 1,242 of clay, 593 of iron, 270 of amber, 73 of glass, and 64 of gold. A few of the objects are referable to the Epoch of La Tène. Objects of apparel predominate—bracelets, splendid necklaces of amber, chains with pendants, fibulae, many bronze belts, beads, and ornamental pins with double spiral at the head. The fine series of bronze vases, situlae, etc., hammered bronze testify to intimate commercial relations with Italy. Some of the bronze situlae are of large size, nearly 1 meter (3.3 feet) high and 50 centimeters (19.7 inches) in diameter (Figs. 361 and 362). Other important cemeteries in Austria dating from the Hallstatt Epoch include: Gemeinlebarn, Hadersdorf, Feichten-

boden, Paudorf, Rabensburg, Statzendorf (near Herzogenburg), and Stillfried, all in Lower Austria; and Altendorf and Wies in Styria.

The Hallstatt Epoch is represented in various parts of Europe: Hungary, at Oedenburg; Gorizia, at Santa Lucia (flat graves); Carniola, at Watsch, Hrastje, Magdalenberg, Roviše, Sankt Margarethen, Tersiše, Töplitz; Moravia, at Býčiskala (Adamstal); Württemberg, at Burrenhof (2,500 graves, vase painted in red, yellow, and brown), Bavaria, at Würzburg; and Switzerland, at Unter Lunkhofen in the Aargau (Fig. 363) and Giubiasco, canton of Tessin (Fig. 364).

FIG. 363. POTTERY VASE OF THE HALLSTATT EPOCH, FROM UNTER LUNKHOFEN, SWITZERLAND.
Photograph by Viollier.

In southern Germany and eastern and central France two phases of the Hallstatt Epoch are distinguishable. The first phase is characterized by great iron swords and practically no articles of adornment, the second phase by short swords with antennae and multifarious articles of adornment.

The following is a brief inventory of objects belonging to the two phases of the Hallstatt Epoch:

PHASE I (*ca.* 900-700 B.C.).—Swords of bronze and swords of the same type in iron, bronze razors of openwork, no fibulae, Italian vases of beaten bronze, ceramic urns with flaring rims.

PHASE II (*ca.* 700-500 B.C.).—Iron swords and poniards with antennae, various bronze anklets and bracelets, belts of beaten bronze with stamped ornamentation, earrings of bronze, fibulae of various types, bronze pins with swanlike terminal curvature, ceramic urns with bulging sides, black figured Attic vases of the 6th century B.C.

FIG. 364. GRAVE OF THE HALLSTATT EPOCH DISCOVERED AT GIUBIASCO, SWITZERLAND.

The upper picture shows the grave before the covering stones were removed; the lower picture, the opened grave. Photographs by Viollier.

The Hallstatt Epoch has sometimes been referred to as the *epoch of tumuli.* Such a statement is misleading, for the reason that dolmenic tumuli were employed in the Neolithic Period; besides, sepulchral mounds were in use at an early phase of the Bronze Age. Moreover, tumuli did not disappear with the passing of the Hallstatt Epoch, but persisted in certain regions during the Epoch of La Tène. Nevertheless, the sepulture type for the first epoch of the Iron Age can justly be styled tumular. Flat sepultures were exceptional. Successive burials were made in the same tumulus. Many likewise contain intrusive burials belonging to the Epoch of La Tène. The tumuli are, for the most part, oval or circular with a depression at the center. The highest are not more than 5 or 6 meters (16.5 to 19.7 feet) in elevation and the diameter rarely exceeds 30 meters (98.5 feet).

Hallstattian tumuli may be divided into two categories, those in which the central sepulture is at the original level of the ground, and those in which it occupies a pit excavated beneath the original ground level. The latter is more rare and generally contains a central incineration. The only difference between it and the *tomba a pozzo* of the Villanovan necropoli of northern Italy is that it is covered by a tumulus.

The first phase of the Hallstatt Epoch is well represented in four large tumuli explored by Flouest in the commune of Magny-Lambert (Burgundy). One of these, known as Monceau-Laurent, may serve as a type. The central core is an imbricated structure of flat stones. At its center is the sepulchral chamber built of flagstones set upright. Over the whole is a "chape" of clay which in turn is covered by a layer of stones.

With the second phase of the Hallstatt Epoch appeared the rich chariot burials which persisted during the Epoch of La Tène (Fig. 401). The tumulus of La Garenne at Les Mousselots, near Châtillon-sur-Seine (Côte-d'Or), is an example. Before it was leveled by a farmer in 1845–1846, this tumulus, composed of earth and stones, measured 4 meters (13.1 feet) in height by 70 meters (229.8 feet) in diameter. In it were found the remains of a chariot, a tripod of iron and bronze, and a splendid bronze basin ornamented with four griffon heads, the last of Greek workmanship dating from the seventh to sixth century. At Les Mousselots is an-

other tumulus which yielded rich archeological treasure when opened in 1863, the tumulus known as Le Champ de la Butte. It was an inhumation chariot burial. With the body were found two gold earrings and a gold bracelet.

Celtic tumuli are particularly abundant in the plateau region of Doubs and Jura, attesting a relatively dense population made possible by rich salt deposits and forests of oak. In this section is located Alesia, mentioned in Cæsar's *Commentaries*.

La Motte d'Apremont, one of the most important tumuli in Haute-Saône, had about the same dimensions as that of La Garenne (4 meters high by 70 meters in diameter); it was composed wholly of sandy earth. It yielded fragments of a four-wheeled chariot, gold fibulae, a gold crown in repoussé work, beads of amber and ivory, a gold cup, an iron sword, a flint arrowhead, and a large bronze basin with iron handles. The chariot burial of Apremont belongs to the second phase of the Hallstatt Epoch.

The Pyrenean region is rich in tumuli of the Hallstatt Epoch, but their builders were poor in comparison with those who left important treasures in the tumuli of eastern Gaul. Italian situlae Greek vases, gold ornaments, and metal tripods are lacking. One does, however, find two characteristic objects, the poniard with antennae and the iron javelin. The sepultures opened by General Pothier on the plateau of Gers all belong to the incineration class. As a rule, several cinerary urns are found in each tumulus. In addition to calcined bones, these urns contain remnants of the deceased's apparel very much damaged by the flames. The cinerary urns are accompanied by vases containing offerings of various kinds. The Hallstattians of the Pyrenees had their own sources of salt supply at Salies-du-Salat (Haute-Garonne) and Salies-de-Béarn (Basses-Pyrénées).

Crossing the Pyrenees into Spain, one finds an important center of Hallstatt culture in the province of Guadalajara, likewise in proximity to saline deposits. The Marquis of Cerralbo has explored a great necropolis at Aguilar de Anguita near the head waters of the Jalón. Incineration was the rite in all the more than two thousand tombs uncovered at Aguilar. The tombs were in rows, each marked by a crude stela. Some of the male sepultures contained the complete equipment of a warrior—iron poniard with

antennae, two lances differing in size, the metal trappings of a shield, bridle bits, etc. The necropolis of Aguilar belongs to the very close of the Hallstatt Epoch. Two other important necropoli near Aguilar have been explored by the Marquis of Cerralbo, namely, Luzaga and Arcobriga; both belong to the Epoch of La Tène.

*Chariot Burials.*—The custom of burying a warrior with his chariot appeared north of the Alps during the second phase of the Hallstatt Epoch. Not more than five or six can be definitely referred to the Hallstatt Epoch, and these are in eastern France. The chariots were both light and luxurious and were for the most part four-wheeled. They are not accompanied by bridle bits or other harness trappings. Hubs and even spokes were covered

FIG. 365. DOUBLE RAMPART OF THE CAMP D'AFFRIQUE, MEURTHE-ET-MOSELLE, FRANCE.

After Beaupré.

with forged iron. Those found at La Garenne and La Butte (Côte d'Or) and Apremont and Savoyeux (Haute-Saône) are examples. Similar chariot burials occur in Switzerland and southern Germany. The principal finds in Switzerland were in two tumuli at Anet, the tumulus of Grauholz and the tumulus of Grächwil, both in the canton of Berne. Similar discoveries have been reported from Bavaria, Württemberg, Baden, and Hohenzollern. In some cases the chariots are two-wheeled and in some four-wheeled. Bronze and iron bridle bits occur in Bavarian tumuli.

*Habitations.*—Much more is known concerning sepultures than of habitations during the first epoch of the Iron Age. A population that left such important tumuli must have possessed fixed abodes, but these for the most part were composed of perishable materials. In eastern France recent explorations have brought to light a number of Hallstatt camps, including the Camp de Château at Salins (Jura) and the Camp d'Affrique at Messein (Meurthe-et-Moselle). A section of the deposits at Camp de Château revealed three successive horizons containing objects referable to the

second phase of the Hallstatt Epoch. At the Camp d'Affrique there is a double concentric rampart which served as a protection for the rectangular huts (Fig. 365).

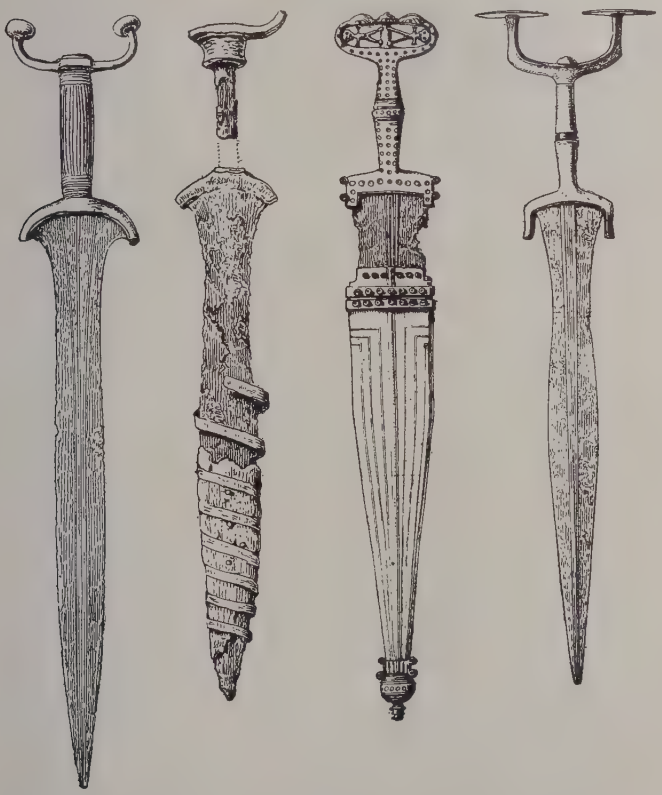

FIG. 366. IRON-BLADED DAGGERS WITH ANTENNAE OF THE HALLSTATT EPOCH, FROM HALLSTATT.

No. 1 has both handle and blade of iron; No. 2 has a wooden sheath; No. 3 is a *de luxe* dagger, the sheath set with river pearls; No. 4 has a bronze handle. Scale, *ca.* $\frac{1}{4}$. After von Sacken.

Hallstatt camps similar to the Camp de Château and the Camp d'Affrique have been explored in Saxony. Steinsburg, near Römhild in Thüringen, affords a good example. It belongs to the very

close of the Hallstatt Epoch and continued to be occupied during the Epoch of La Tène. Foundations of dry masonry prove that the houses were constructed on rectangular as well as circular plans. The ellipse formed by the ramparts at Steinsburg measures 1,052 by 838 meters (3,453.2 by 2,751.4 feet), one of the largest (La Tène) strongholds in Germany. It was defended by several concentric walls of dry masonry (basalt).

FIG. 367. BRONZE SITULA OF THE HALLSTATT EPOCH, FROM THE CERTOSA OF BOLOGNA, ITALY.

Oriental influence is clearly seen in the decorations. Scale, *ca.* $\frac{2}{5}$.

The Hallstatt Epoch seems to have been the one in which inland or continental sources of salt supply were first worked on a commercial basis. Waters charged with salt were allowed to trickle over bars of baked clay under which a fire burned. As the water evaporated, the salt crystallized on the heated bars. Quantities of baked-clay débris have been found on salt-factory sites, particularly in the valley of the Seille, near Vic de Burthecourt (Lorraine), France.

FIG. 368. BRONZE VASE OF THE HALLSTATT EPOCH, FROM GRACHWIL, SWITZERLAND.
Photograph by Tschumi.

*Weapons.*—Hallstatt swords were remarkable for uniformity of type in contrast with the variety of types in use during the Bronze Age. The first sword was of bronze, similar to one of the models of the fourth epoch of the Bronze Age. The second was a long, heavy iron copy of the first. The scabbard continued to be of wood or leather. The third type was a short sword of iron with the pommel terminating in two horns or antennae; in some cases the scabbard is of beaten bronze. The absence of defensive

FIG. 369. BRONZE BUCKETS WITH RIBBED SIDES OF THE HALLSTATT EPOCH.

The one on the left, when found in a tumulus near Orléans, France, contained human bones, probably of a female, fragments of textiles and a few objects of iron.

armor in metal is likewise to be noted. Helmets and shields, if they existed at all, were made of more perishable material.

The Hallstatt dagger with antennae is more varied than the sword. The iron blade is pointed and generally ribbed. The handle is of bronze or iron, terminating in two antennae. The length averages about 45 centimeters (17.7 inches). The breadth of the blade is quite variable, the broadest being classed as the most recent. A few of the Hallstatt poniards from northern Italy and southern Germany have but one edge, the dorsal portion of the

blade being very thick. Beginning with the second phase of the Hallstatt Epoch, metal sheaths were the rule for daggers—at first bronze and then iron (Fig. 366). The earliest Hallstatt lances resemble the classic model of the Bronze Age; those of the second phase of the Hallstatt Epoch are more varied in form. According to Déchelette, the bow and arrow did not play an important rôle during the Hallstatt Epoch.

FIG. 370. BRONZE VASES WHICH SERVED AS WINE PITCHERS AT THE END OF THE HALLSTATT EPOCH AND AT THE BEGINNING OF THE EPOCH OF LA TÈNE.

These vases, belonging to what is known as the œnochoe type, are obviously of Greek origin.

*Tools and Utensils.*—Bronze buckets are of two types, (1) cylindrical and (2) those with bulging sides. Both were made by riveting together pieces of sheet bronze. The vessel with bulging sides is called situla. Three types of the situla belong to the Hallstatt Epoch: (1) the plain situla, (2) the situla with European geometric decoration, and (3) the situla with Greco-Oriental decoration. Situlæ are provided with one or two movable handles. The plain situla is found in Italy, Ireland, and central Europe. Situlae with

geometric decoration do not occur in Gaul, but they have been reported from Scandinavia and central Europe.

During the second phase of the Hallstatt Epoch, the Greco-Oriental influence began to be manifest in Italy and central Europe. Situlae decorated in this style have been found at Bologna (Fig. 367), Este, in the Tyrol, Carniola, Istria, Austria, and Styria. Figures in repoussé fill zones which often cover practically the whole body of the vessel. The situla found at Watsch in Carniola is a good example. One zone contains men riding in horse-drawn two-wheeled chariots or on horseback, also on foot leading or driving horses. In another are human figures seated, standing, or in action. A third zone is devoted entirely to animal forms.

FIG. 371. PAINTED CLAY VESSELS OF THE HALLSTATT EPOCH, FROM BOHEMIA.

These urns, found in an inhumation burial, were decorated in black on an orange slip. Originals in the National Museum, Prague. Photograph by J. Schranil.

A splendid bronze vase was discovered in 1851 in a large Hallstatt tumulus at Grächwil, parish of Meikirch (Berne), where the incineration sepulture was encountered at a depth of 2 meters (6.5 feet). The vase (Fig. 368) was full of ashes, and about it were the remains of a chariot with iron wheels, two bronze fibulae, and a clay vessel. The walls of the vase, now preserved in the museum at Berne, are thin, its form perfect, and its decoration admirable. The principal ornament rests on the shoulder and is attached near its summit to the rim. It represents a winged female divinity. In each hand she holds a hare, and about her are grouped two pairs of lions, a double-headed serpent, and an eagle. A palmette forms a base for the group.

This divinity, evidently of Asiatic origin, is found on many metal and clay objects belonging to the archaic Greek Epoch, and always with the same animal entourage. The two handles of the vase are both broken and in exactly the same manner.

Cylindrical vessels with ribbed sides are divided into two series, (1) those with fixed handles and (2) those with movable handles (Fig. 369). The first group come almost exclusively from the necropoli of Bologna; the second group is found not only all over Italy, but also in the countries north of the Alps. Bronze vases of the œnochoë type, which were used as wine pitchers, are obviously of Greek origin; they are often found at sites belonging to the second phase of the Hallstatt Epoch and La Tène I (Fig. 370).

Large bronze cauldrons often supported by tripods were in general use in Greece and Italy during the Hallstatt Epoch. In central Europe and Gaul pothooks are associated with bronze cauldrons before the close of the epoch. The association of tripod and cauldron occurs in the tumulus of La Garenne at Sainte-Colombe, near Châtillon-sur-Seine (Côte d'Or). The cauldron is of bronze, the tripod of bronze and iron. To the shoulder of the cauldron are attached four griffon heads of cast bronze, chiseled. Similar griffon heads dating from the seventh century B.C. were found at Olympia.[1]

FIG. 372. GLASS VESSEL FROM HALLSTATT.

Glass vases first appeared in central Europe during the second phase of the Hallstatt Epoch. Scale, ⅔. After Von Sacken.

During the Hallstatt Epoch the primitive hearth of stones gave place to one fitted for the use of such domestic aids as andirons, spits, pothooks, and of course the cauldron—all originally importations from beyond the Alps. Bronze cups and bowls were more varied and numerous during the Hallstatt Epoch than they were during the Bronze Age. Some were importations from the south, others were products of local factories. They were generally deposited in a large vase or situla in case of inhumation, or in the cinerary urn. There are several varieties depending on form and finish. Some are provided with a single handle attached to the

rim and near the base. The form of the body is ovoid to hemispherical. In some cases the rim is left plain, in others it is decorated with an incised or a repoussé pattern.

The Hallstatt Epoch witnessed an important change in the art of making knives—the knife with articulating blade, suitable for the pocket. The old type persisted, to be sure, but at the station of Hallstatt there were found knives with iron blades that could be shut in bone handles and carried in the pocket, a form which persists to-day in the ordinary pocket knife. The knives of the epoch were of iron. The nonarticulating blades were often recurved at the end; in some, a ring was attached to the end of the handle.

FIG. 373. FEMALE COSTUME OF THE HALLSTATT EPOCH.

After studying textile relics from tumuli, Keller made this reconstruction of a female costume consisting of a sleeveless tunic fastened at the waist by a broad belt and covered by a mantle. After Keller.

*Pottery.* — The potter's wheel was still unknown in central and western Europe, but the potter knew how to produce by hand a remarkably regular surface. Small cups are frequently found in sepultures of the epoch; where incineration was practiced, they were placed within the cinerary urn. In many cases these libation cups form an integral part of the funerary urn, being attached in one or two rows about the neck and on the shoulder of the urn. There were two classes of pottery vessels, (1) those reserved for funerary purposes and (2) those for common usage. The common ware was made of a brown, black, or reddish paste of rather fine texture, especially in the case of smaller vessels, but friable and not well baked. Much of this

ware is perfectly plain; some of it is decorated by means of simple geometric motives.

The classic motive known as the meander appeared in central Europe during the Hallstatt Epoch. An urn with meander pattern was found in an inhumation sepulture of rough stones under a tumulus at Diarville (Vosges). Examples have likewise been cited from Hallstatt, from the tumulus of Bois de Langres (Haute-Marne), and from Villement (Indre). A decoration composed of parallel undulating lines apparently put on with a comb has been

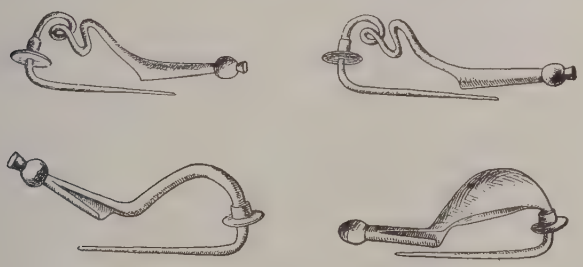

FIG. 374. SAFETY PINS OF THE HALLSTATT EPOCH, FROM SALINS, JURA.

The two fibulae in the upper row have a serpentiform arch; those in the lower are without spring. After Piroutet.

found in the Camp de Château at Salins (Jura) and at Court-Saint-Etienne, Belgium.

Painted pottery appeared in Germany with the beginning of the Hallstatt Epoch. Most of the painted vases are covered with a yellow slip on which geometric figures in black, or red and black, are painted (Fig. 371). The figures include the various solar symbols, triangular and lozenge-shaped patterns, stylistic animal and human representations. Fine examples have been found at Buchheim (Baden) and Burrenhof (Württemberg). Painted pottery dating from the Hallstatt Epoch is exceedingly rare in France.

Certain ritualistic ceramic decorations from central Europe deserve more than a passing notice. They consist of animal or human figuration, both in the round and engraved. They represent either sacred animals like the horse, swan, ox, and ram, or sacrificial and funeral ceremonies. Some of the best examples have

come from Oedenburg and Gemeinlebarn (Hungary) and Beckersloh (Bavaria).

Glass vases made their first appearance in central Europe during the second phase of the Hallstatt Epoch (Fig. 372). Three small vertically ribbed glass cups, yellowish-green to brownish-green in color, were found in the cemetery at Hallstatt. A fragment of a squarish flagon, translucid, deep violet with whitish

FIG. 375. SIGMOID AND NAVICELLA FIBULAE FROM HALLSTATT.
Scale, *ca.* ½. After von Sacken.

bands, has been reported from the tumulus of Belle-Remise near Pflugfelden. Similar glass vessels were much more numerous on the Mediterranean coast where the art had been transplanted from Egypt. Glass vessels were made by hand or with the aid of a mold. Glass blowing was unknown until the Imperial Roman Epoch.

*Dress and Ornament.*—The costume, both male and female, during the Hallstatt Epoch seems to have been characterized by simplicity. Sword and razor were the usual accompaniments in a

warrior's sepulture. In the Lausanne Museum are to be seen bronze bracelets with iron inlay dating from the beginning of the Iron Age. During the second phase of the Hallstatt Epoch, belts and bracelets were much in vogue among the women. Leather belts with trappings of stamped metal were highly prized. The textile art had developed until light garments of fine weave were possible. It seems to have been the custom to envelop the funeral offerings in cloth, only vestiges of which remain.

Keller attempted to reconstruct the female costume from textile relics discovered in the tumuli of Dörflingen and Trüllikon (Fig. 373). It consists of an armless tunic and a mantle fastened in front by means of fibulae. On the head rests a sort of diadem composed of a series of radiating hairpins held in place by a leather band. A broad ornamental belt, necklace, earrings, bracelets, and anklets completed the outfit.

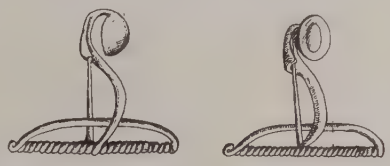

FIG. 376. FIBULAE OF THE HALLSTATT EPOCH, FROM SALINS, JURA.

This is called the Certosa type of fibula, characterized by lateral spring, elbow-shaped arch, and recurved terminal button. After Piroutet.

The numerous bracelets and anklets of the second phase of the Hallstatt Epoch were made of various materials—bronze, iron, lignite, and gold. Many forms are encountered—solid, open, articulated, hollow, ribbed, broad, narrow. By the middle of the Hallstatt Epoch the fibula largely displaced the pin in central Europe.

Fibulae were rare in France and Switzerland, not only during the Bronze Age, but also during the first phase of the Hallstatt Epoch. Fibulae of this phase are nearly always of bronze. Those with unilateral spring are the oldest; then came the type with bilateral spring, also types without spring, and with or without serpentiform arch (Fig. 374). The arch in the older types is often swollen and hollow (*fibule à navicella*). The clasp varies in length and may or may not be provided with a terminal button (Fig. 375). A type characteristic of northern Italy during the second phase of the Hallstatt Epoch is known as the fibula of La Certosa (the name of a necropolis at Bologna). The arch is elbow-shaped and the terminal button recurved (Fig. 376).

The belt became an important adjunct to female apparel during the second Hallstatt phase. It was of bronze or of leather with geometric ornaments of beaten bronze. These belts were usually of ample breadth, sometimes even broad enough to be a good substitute for a corset. A large number were found in the cemetery at Hallstatt. Many have been unearthed also in France, Switzerland, Germany, and Czechoslovakia.

Gold was used sparingly during the Hallstatt Epoch, being confined to small articles such as earrings, pendants, bracelets, etc. The goldsmith had learned how to economize and at the same time achieve satisfactory results. A remarkable exception to the rule is afforded by the golden bowl found near Zurich in 1906 (Fig. 377), which weighs 910 grammes (*ca.* 29.2 ounces troy). It had been deposited in an inverted position on a flat stone and covered by means of a pottery vessel (also inverted), presumably a cache or hoard, since nothing suggesting a grave was found there. On the mammillated field one can distinguish four figures of the sun and four of the moon (crescent), likewise animal representations scarcely determinable. The bowl had apparently to do with some ritual. Outside of three or four stations near the eastern frontier, very few specimens have been found in France.

Commerce in amber from the Baltic attained considerable proportions during the first Hallstatt phase. Thousands of amber beads were found at Hallstatt. They occurred in more than three hundred sepultures and were apparently owned by the poor as well as by the rich. The principal amber route of the time was between the Baltic and the Adriatic.

Coral, like amber, was supposed to have marvelous qualities. It was believed to have medicinal as well as talismanic power. Its color sufficed to make it popular as an ornament. Frequently employed in central Europe, it made its first appearance in France only toward the close of the Hallstatt Epoch. An interesting necklace in nine parallel rows of coral stems perforated lengthwise and supported by crossbars of ivory was found in a Hallstatt tumulus of the second phase at Kaltbrünn in the Grand Duchy of Baden. Ivory does not seem to have been much in vogue during the epoch. The only glass beads known in central Europe during the Bronze Age were importations from the south. They are found in greater

number and variety during the Iron Age, especially during the second Hallstatt phase.

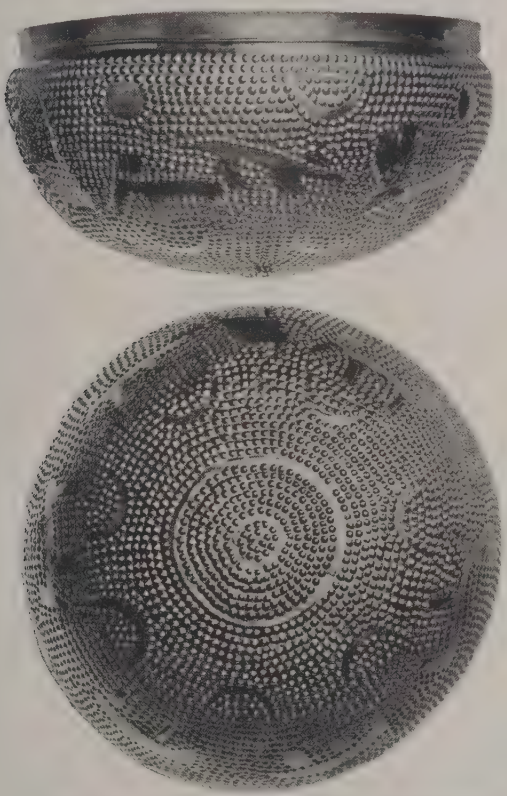

FIG. 377. GOLDEN RITUAL BOWL OF THE HALLSTATT EPOCH FOUND NEAR ZURICH, SWITZERLAND.

This beautiful vessel had probably been cached, for when found it was in an inverted position on a flat stone and covered with an inverted pottery vessel. On the mammillated field one can distinguish four figures of the sun and four of the moon (crescent), also animal representations. Scale, *ca.* $\frac{3}{10}$. Photograph by Viollier.

Symbols associated with sun worship were employed as decorative features on articles of apparel or personal adornment throughout the Iron Age. They include various representations of the

sun's disk, the crescent, swan, horse, etc. The Antiquarium of Munich possesses two fine gold pendants from Vulci, Etruria, each of which bears a mammilated figure of the sun and the moon. The same symbols are seen on the golden bowl of Zurich (see Fig. 377). Sun amulets are frequently met with on belts and belt buckles.

## The Epoch of La Tène

The second epoch of the Iron Age covered a period of some five hundred years, ending with the beginning of the Christian Era. Three phases of this epoch (early, middle, and late) were first recognized by O. Tischler in 1885; they were later rechristened by S. Reinach as follows:

La Tène I. 500-300 B.C.
La Tène II. 300-100 B.C.
La Tène III. 100 B.C.—Christian Era.

The type station of the epoch, La Tène, is situated at the eastern end of Lake Neuchâtel and on the south bank of the river Thielle; in it the last two phases of the epoch are represented. La Tène was chosen for the type station as early as 1874 by Hildebrand because of the nature and importance of the finds made there by Schwab and Desor.

In 1858, when explorations were begun at La Tène by Colonel Schwab, the site was entirely covered by the waters of Lake Neuchâtel. Important engineering works carried on from 1868 to 1881 resulted in the lowering of the water level of the lake by 2 meters (6.56 feet). This brought the site above water level and facilitated the excavations undertaken by Émile Vouga who uncovered the piles of numerous buildings and of a bridge across the Thielle which drains Lake Neuchâtel. Continuing his excavations along the river, Vouga found piles of a second bridge (the bridges are named for Vouga and Desor) and of other buildings. The station has yielded a rich harvest to a number of explorers, including F. Schwab, E. Desor, V. Gross, F. Borel, W. Wavre, and Émile and Paul Vouga (father and son). Paul Vouga estimates that some 2,600 objects from this site have found their way

into various public museums. The principal collections from La Tène are to be found in the museums at Neuchâtel, Zurich, Berne, Geneva, and Bienne. They belong, for the most part, to the second phase of the epoch and include many weapons both offensive and defensive. The prevalence of these weapons, the strategic position of the place, the absence of evidence suggesting a place of manufacture, as well as the absence of female apparel and of objects pertaining to family life, have led Paul Vouga to the conclusion that La Tène was a fortified emporium (*entrepôt*) occupied by the military.

The beginning of the second phase of the epoch of La Tène witnessed an important step forward, the use of money as a medium of exchange, borrowed from Greece and Rome. Another valuable aid to commerce was the gradual development of overland routes. These were factors that contributed largely toward making possible a uniform culture over a relatively vast territory stretching from Gaul by way of Bavaria and Bohemia to Hungary.

*Habitations.*—During the first and second phases of the Epoch of La Tène, dwellings were about as simple as the Neolithic huts. The ground plan was either round or rectangular. Paul du Chatellier has described an *oppidum* of La Tène I at Tronoën in Finistère, which covers an area of 25 hectares (61.8 acres). There were many cabin pits, both Gallic and Roman. The Gallic pits were rectangular, with an average length of 5 or 6 meters (16.4 to 19.7 feet). The substructure was of rough stones, the superstructure of branches covered by clay. Nearly all contained swords, lances, and daggers of iron.

The third phase of the Epoch of La Tène witnessed a considerable development in the direction of urban life. Fortifications were no longer simple places of refuge, but were real centers of commerce and population. Such were Alesia, Mount Beuvray, and Gergovia in Gaul, and Stradonitz in Czechoslovakia.

On Mount Beuvray, 27 kilometers (16.8 miles) from Autun (Saône-et-Loire) and at a height of 822 meters (2,698.9 feet) above the sea, there was a city covering an area of 135 hectares (333.45 acres). It was protected by a powerful rampart. It belongs wholly to the third phase of La Tène and was not abandoned until the year 5 B.C. The dwellings, built of wood and dry

masonry, were all rectangular in ground plan. The corners of the walls were of cut granite. For the most part the dwellings were about half underground, the descent being by an inside stairway of several steps. The roofs were as a rule thatched, although Roman tile had already made its appearance. Many of the dwellings consisted of but a single room. There were, however, elaborate houses containing from several to as many as thirty rooms surrounding a central rectangular *atrium* in Pompeian fashion.

Coins have been found in large numbers at Mount Beuvray. One is impressed by the variety of types, which indicates that there was no uniform system of coinage among the Gauls. Gallic coins predominate, but there also occur Celtiberian, Mauritanian, and Roman coins, as well as Greek coins from Marseilles.

The fortified industrial city of Gergovia (Puy-de Dôme) is on Mount Gergovia at an elevation of 744 meters (2,442.8 feet) and 6 kilometers (3.75 miles) south of Clermont-Ferrand. It has never been thoroughly explored. The relics resemble those found at Mount Beuvray—débris of amphorae brought from Italy by way of Marseilles, pottery of other kinds, ingots of bronze, Gallic coins, etc.

Alesia, where Vercingetorix succumbed to the Roman legions, occupies the summit of Mount Auxois (Côte d'Or). It was protected by rocky escarpments, supplemented in places by a wall of dry masonry. The huts were built in part on a circular, and in part on a rectangular, ground plan. In some cases there was a substructure of dry masonry as at Mount Beuvray. The two strongholds were contemporary.

The richest among *oppida* of La Tène III is Stradonitz, 32 kilometers (20 miles) southwest of Prague in Czechoslovakia. It covered an area of 140 hectares (345.8 acres). The dwellings were of wood, the floors of beaten clay somewhat reddened in part by fire. Some twenty thousand relics have been found at Stradonitz, including many Gallic coins in gold, bronze, and silver, fibulae of gold, bronze, and iron, bracelets, beads, painted vases, enameled bronzes, weapons, tools, etc. There are several stations that form a connecting chain between Mount Beuvray and Stradonitz, the principal ones being Manching, near Ingolstadt, and Karlstein, near Reichenhall, both in Upper Bavaria. One of the best

known stations in Hungary is Velem St. Veit (Steinamanger), which was inhabited not only during the phase of La Tène III, but also during the Bronze Age.

In the British Isles the Epoch of La Tène is represented by *oppida* as well as by pile villages. A good example of the latter is Glastonbury (Somerset). This village, surrounded by a palisade, was built in a swamp on an artificial island; it consisted of about seventy dwellings, oval to circular in ground plan. The site has been thoroughly explored by Bulleid, who found very few weapons. The objects recovered include pottery with incised decoration, spits, fibulae, weavers' combs and other objects made of bone, a wooden vessel artistically decorated, an oak table in the shape of a toadstool, beads of glass and amber, a bronze mirror, a vase, and tweezers. The finds indicate that Glastonbury was occupied chiefly during the third phase of the Epoch of La Tène. The round towers of Scotland known locally as *brochs* were built during the Epoch of La Tène.

*Weapons.*—The sword was the offensive weapon *par excellence,* as it had been during the Epoch of Hallstatt. The sword of La Tène I differed in no essential way from the short sword of the second Hallstatt phase, some of the finest specimens coming from the middle Rhine district. The antennae gradually disappeared. The scabbards are of iron with an external marginal trimming of bronze. The short sword disappeared during the second and third phases of La Tène. Swords were attached to the belt by means of a suspension buckle, and in sepultures they occur for the most part on the right side of the skeleton.

La Tène swords testify to a high degree of technical skill. The makers apparently knew how to produce a body of hard iron with edges of soft iron, so that, when dulled or injured, the edges could be repaired easily by hammering. The scabbards especially, beginning with La Tène II, are attractively engraved, the sigmoid and triskele being among the dominant patterns. Animal figures are rare and fantastic.

Swords are found in practically all the necropoli of La Tène in France. The museum at Saint-Germain possesses a hundred swords from the department of the Marne alone. La Tène swords from the British Isles present certain original characteristics, begin-

ning with the second phase of the epoch. The scabbards, generally of bronze, are richly ornamented. This phase is well represented at Lisnacroghera, County Antrim (Ireland), and at Hunsbury (Northampton). A sword with a single edge is common in northeastern Germany. A different type of sword with single edge, presumably of Greek origin, is found in Spain. Several examples associated with Greek vases were discovered by L. Siret in the necropolis of Villaricos (Almeria).

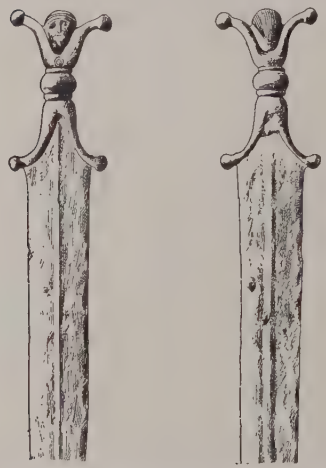

FIG. 378. IRON DAGGER WITH BRONZE EFFIGY HILT, FROM NEUCHÂTEL, SWITZERLAND. EPOCH OF LA TÈNE.

After Reinach.

The dagger of La Tène was derived from the Hallstatt dagger with antennae. Toward the close of the Epoch of La Tène the hilt of this dagger underwent a curious transformation. The terminal spheroidal lump between the antennae was transformed into a human head; forthwith the antennae became human arms, and the hilt a human body and legs (Fig. 378). Examples of human effigy dagger hilts have been found in the British Isles, France, Switzerland, and Italy.

Throughout the Epoch of La Tène the sword had two companion pieces in the lance and the javelin (Fig. 379). The two differ chiefly in point of size; the larger does not leave the hand, the smaller is thrown. During La Tène I the lances recall the Hallstatt types with their points resembling a willow leaf. With La Tène II appeared new forms with notched or undulating (flamboyant) points, sometimes with openwork. Ornamented lances occur primarily in three regions, Switzerland and Hungary (La Tène II) and northeastern Germany (La Tène III). In the region of the Pyrenees javelins have been found in which shaft and point are forged together from a single piece of iron.

The barbed arrow was not in common use during the Epoch of La Tène. The bow might have had a wider use than the arrow

since it could have been employed in throwing the javelin. Arrows of iron are for the most part of the socketed type.

Remains of helmets, breastplates, and shields are rare. Their rarity during the Epoch of La Tène is accounted for in part by the perishable nature of the material of which they were made. The Gallic shield represented in a stone statue found in 1834 at Mondragon (Vaucluse) was certainly made of wood. Recently a wooden shield was found in the station of La Tène. In some cases only the umbone is of metal; examples of this sort are frequently met with in La Tène sepultures.

Fig. 379. Lance head of the Epoch of La Tène found in the bed of the Thielle, near Neuchâtel, Switzerland.

The lance is engraved with swastikas, the symbol of movement. Scale, *ca.* $\frac{2}{15}$.

*Helmets and Shields.*—With the possible exception of the shield, defensive armor was rare during the Epoch of La Tène. The Gallic helmet is known through the discovery of only a small number of actual specimens and through representations on certain ancient monuments. Warriors wearing horned helmets are sculptured on the monument built by Julius Caesar at Saint-Rémy and on the triumphal arch at

Orange; some of these representations are surmounted by the wheel, symbolic of the sun's disk. The wheel is often found on Italian helmets of the Villanovan Epoch.

The horned helmet is found among various peoples of antiquity —Assyrians, Babylonians, Greeks, Italians. One of the rare examples occurring north of the Alps is the bronze helmet found in the bed of the Thames, near the Waterloo Bridge, London, in 1868; it is composed of several thin sheets of hammered bronze,

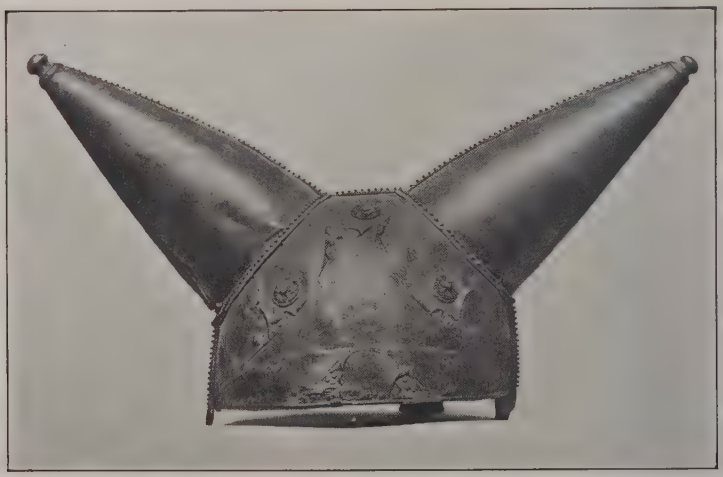

FIG. 380. HELMET OF HAMMERED BRONZE BELONGING TO THE EPOCH OF LA TÈNE.

This rare example was found in the Thames near the Waterloo Bridge, London, in 1868. Photograph from the British Museum.

held together by means of rivets. The horns are straight, conical, and divergent (Fig. 380).

Beginning with the fifth century B.C. one finds Italian helmets imitated by Celtic workmen, who adapted the classic decorations to the Celtic taste, as well as the form, for their helmets are more pointed at the top. The ornamentation is often exceedingly artistic, consisting of triskeles, sigmoid patterns, stylistic palmettes, and geometric tracery. A magnificent Gallic example, dating from La Tène I, was found in 1861, in an ancient arm of the Seine at Amfreville (Eure), and is now preserved in the Louvre. It is of

gilded bronze and seems also to have been enameled (Fig. 381). Other less sumptuous Gallic helmets derived from Italian prototypes have been found in the department of the Marne at Berru, Cuperly, and La Gorge-Meillet.

If the Gauls made use of the shield during La Tène I, they must have employed wood or leather without metal mounting. A wooden shield was discovered by Vouga in 1910 at the type station of La Tène. With it were a spear sword, the skeleton of a war-

FIG. 381. HELMET OF THE EPOCH OF LA TÈNE FROM AMFREVILLE-SOUS-LES-MONTS, EURE, FRANCE.

This is a splendid example of a gilded bronze helmet dating from La Tène I. Original in the Louvre. Photograph from the Museum at Saint-Germain.

rior, and the remains of his chariot, including a well preserved wooden yoke (Fig. 382). Beginning with La Tène II, umbones of shields are frequently met with, not only in the Marne region but also in other parts of France and neighboring countries.

La Tène III is characterized by the disappearance of the semi-cylindrical type and the persistence of the ellipsoidal type of shield; two fine examples of the latter are to be seen in the British Museum. The older of the two, found in the Witham River, is ornamented with coral. The umbone in repoussé forms the central portion of a longitudinal armature. Surrounding the umbone on three sides

FIG. 382. PIECES OF WOODEN HARNESS FROM THE TYPE STATION OF LA TÈNE, LAKE NEUCHÂTEL, SWITZERLAND.

Nos. 1, 1*a*, large wooden yoke for oxen; No. 2, small wooden yoke probably for horses; No. 3, half a pack saddle; Nos. 4–6, parts of pack saddles. Scale, No. 1, *ca.* $\frac{1}{11}$; No. 2, *ca.* $\frac{1}{10}$; others, *ca.* $\frac{1}{8}$. After P. Vouga.

is a piece of metal appliqué representing a wild boar, a Gallic tribal emblem. The second example, found in the Thames at Battersea (London) in 1855, is ornamented with twenty-seven buttons of red enamel attached by rivets through the center and by ornamental bronze stays which are embedded in the enamel but do not pass through it. (Fig. 383.) Here the ribs connecting the terminal disks with the umbone are nearly eliminated. The entire length of the shield is 35.5 centimeters (14 inches) less than the Witham example.

FIG. 383. SHIELD OF ENAMELED BRONZE OF THE EPOCH OF LA TÈNE, FOUND IN THE THAMES AT BATTERSEA, LONDON.

The shield is about 80 centimeters (31 inches) long. Photograph from the British Museum.

La Tène warriors laid much stress on military insignia. They marched to combat accompanied by symbolic figures mounted on poles, the wheel and the wild boar being their favorite symbols. Contrary to the general belief, the cock was not a national Gallic symbol. There is nothing in text or on monument to support its claim. On the other hand, the figure of the wild boar often recurs—on bas-reliefs at Orange, on a frieze at Narbonne, and on

the shield from Witham just noted. The wild boar surmounts the warrior helmets on the vase of Gundestrup (Figs. 384–386); it also appears among amulets and coins of the time.

Valor likewise found support in the war whoop, the beating of lances against shields, and the blowing of trumpets. The trumpet known in the texts as *carnyx* is represented in Gallo-Roman, Roman, and Greek sculpture, as well as on coins. A bronze male

FIG. 384. SILVER CAULDRON OR VASE FOUND IN A PEAT BOG AT GUNDESTRUP, JUTLAND. EPOCH OF LA TÈNE.

Of the eight outer plaques, four carry the male bust as a central figure and four the female bust (one of which is lost). There are five upright inner plaques (see Fig. 385) and one round plaque covering the bottom (see Fig. 386). Scale, *ca.* ⅛. After Müller.

figurine from Stradonitz holds in his right hand the *carnyx;* it likewise appears on the vase from Gundestrup.

*Tools and Utensils.*—The ax served a double purpose, being a weapon as well as a tool. Warriors represented on a bronze situla from La Certosa (Bologna) carry axes as weapons; the same is true of the ornamented belt from Watsch (Carniola). Iron axes with sockets parallel with the blade make their appearance during the second epoch of the Iron Age. Some of these are presumably

weapons. Winged axes (of iron) and axes with end sockets not unlike those of the Bronze Age and the Hallstatt Epoch continue to be used.

FIG. 385. TWO OF THE INNER PLAQUES OF THE GUNDESTRUP SILVER VASE.

The upper plaque shows the Gallic god Cerunnus seated, holding in his right hand a torque, while his left grasps the neck of a serpent. On his immediate right there is a stag, and on his left a wolf, animals which played an important rôle in the religious beliefs of the time. The lower plaque shows two processions, one on horseback and one on foot. After Müller.

The big iron knife with but a single edge also served a double purpose: it was useful alike as weapon and as utensil. Examples have been found in several chariot tombs of the Marne and in tombs of La Tène I in other parts of France, in central Europe, and in Italy. Smaller knives likewise occur in tombs of La Tène I. A knife was buried with every man, woman, and child in the

necropolis of Chalons-sur-Marne (Marne). During the second and third phases of the second epoch of Iron, knives were widely used, some of them differing but slightly from types still in use. Fishing was an important industry as indicated by the presence of fishhooks, harpoons, and tridents (Fig. 387).

Anvils and hammers of iron belonging to the Epoch of La Tène do not differ materially in shape from those still in use (Fig. 388); this is true also of chisels, paring knives, awls, gouges, saws, and picks. Compasses make their appearance, a pair having been found in the tumulus of Celles near Neussargues (Cantal). A foundry

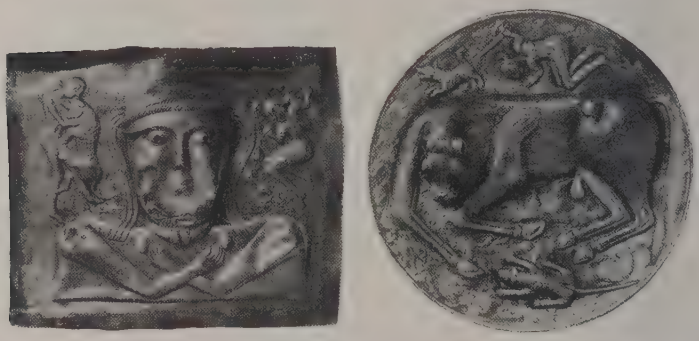

FIG. 386. ONE OF THE OUTER AND THE CENTRAL INNER PLAQUE OF THE GUNDESTRUP VASE.

That on the left is an exterior plaque with a female deity as the principal figure. Over her right shoulder can be seen a figure, probably representing Hercules fighting the lion. The plaque on the right, from the bottom of the vase, depicts the hunting of the bull. After Müller.

site dating from La Tène III at Szalacska, near Kaposvàr, Hungary, was explored in 1906. An inventory of the objects recovered there includes a pair of forceps. A plane of the type still in use by coopers and carriage makers dates from La Tène III. It consists of a one-edged blade slightly bowed and terminating in a pair of handles, each handle parallel with the other. Examples have been reported from Dun-le-Roi (Cher), Celles (Cantal), and Idria near Bača.

With the increase of wealth and means of accumulating it, the need of locks and keys became acute. If such means of security existed prior to La Tène III, and in all probability they did, they

FIG. 387. FISHING AND HUNTING IMPLEMENTS OF IRON AND BRONZE FROM LAKES NEUCHÂTEL, ZURICH, AND BIENNE, SWITZERLAND.

Nos. 1–12, fishhooks; Nos. 13, 14, harpoons; No. 15, trident; Nos. 16–22, boat hooks; No. 23, boar spear. Scale, *ca.* $\frac{2}{7}$. After Vouga.

were probably simple wooden devices that have long since decayed leaving no trace. The iron key was in common use north of the Alps during the last one hundred years before Christ. The stations

where iron keys have been found include: *oppidum* of Mount Caburn, near Lowes, England; Boviolles and Saint-Pierre-en-Chastre (Oise); Mount Beuvray (Saône-et-Loire); Pommiers (Aisne); and Stradonitz (Bohemia). There are three well defined types: the simplest is a bent bar of iron, the so-called temple key; the second is in the form of the letter T; the third is a bent bar of iron provided with a variable number of teeth near the end opposite the handle.

Dice and other games were played during the Epoch of La Tène. They have been found in the type station of La Tène. An example found in the tumulus of Magny-Lambert dates from

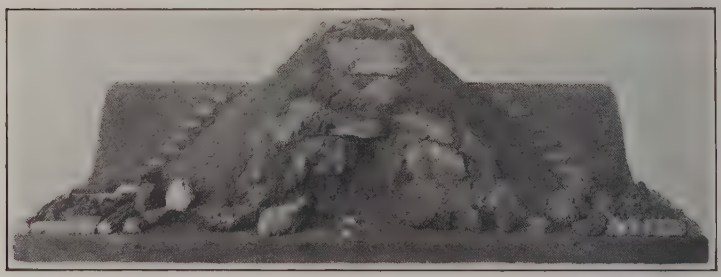

FIG. 388. IRON FORGE FROM THE BERNESE JURA. EPOCH OF LA TÈNE.
Photograph by Tschumi.

the first phase of La Tène. The dice are made of bronze, of bone, or of stone, and are marked with concentric circles. A large number of dice were found at Stradonitz in Bohemia. The disks cut from potsherds, found so plentifully in sepultures of La Tène III, are supposed to have been employed in games.

Andirons of iron made their appearance during the Hallstatt Epoch. Rare during the first and second phases of La Tène, they seem to have been more in use during the final phase (Fig. 389). Déchelette mentions two kinds, the andiron of clay and the andiron of hammered iron. The pottery andirons are ornamented practically without exception with ram heads—emblem of sacrifice. Other hearth utensils include pokers, pothangers, spits, cauldrons, and large cauldron forks.

The Gauls obtained not only their wines from south of the

Alps, but also their best metal pitchers, buckets, pots, saucepans, drinking cups, vases, etc. There were Celtic imitations but they were never so good as the Greco-Italian originals. Bronze *œnochoës* (pitchers) are particularly abundant both in Gaul and southern Germany.

Among agricultural implements the most important are the plow, the scythe, sickle, and a species of hooked knife (Fig. 390). Iron plowshares dating from the first phase of La Tène are rare. The old plow of hard wood must have been an effective implement to have held its place so long in the esteem of the cultivators of the soil. Scythes and sickles were prototypes of those still in use. Hand-

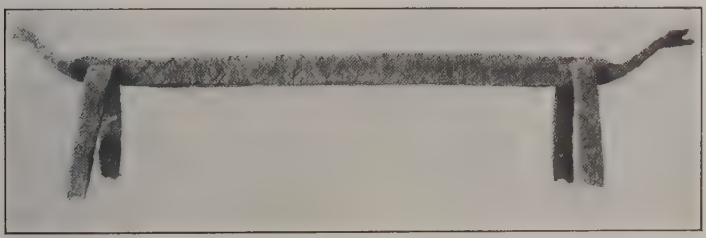

FIG. 389. ANDIRON OF IRON FROM ZIHL, SWITZERLAND. EPOCH OF LA TÈNE.
Photograph by Tschumi.

mills with circular rotating milling stones first came into use during the Epoch of La Tène. The first Celtic models were adaptations from the handmills perfected south of the Alps. The third phase of the epoch is especially represented by circular milling stones. They have been found at the type station of La Tène, Murcens (Lot), Mount Beuvray (Saône-et-Loire), Celles (Cantal), Varimpré (Seine-Inférieure), and Hunsbury (Northampton). The custom of depositing milling stones in sepultures dates from the Neolithic Period (Fig. 391).

*Pottery.*—The ceramic art of the Epoch of La Tène received an impetus from southern examples both in metal and in clay. Another factor in its development was the introduction of the potter's wheel, unknown north of the Alps prior to La Tène I. The wheel had been employed by Ægean potters since the early Bronze Age. By the third phase of La Tène it was known throughout the Celtic world.

FIG. 390. AGRICULTURAL IMPLEMENTS FROM NEUCHÂTEL, ZURICH, AND BERLIN. EPOCH OF LA TÈNE.

No. 1, sickle; Nos. 2, 3, scythes; No. 4, pruning knife; Nos. 5, 6, 7, pruning hooks. Scale, Nos. 1, 4, 5, 6, *ca.* $\frac{3}{10}$; Nos. 2, 3, *ca.* $\frac{1}{5}$; No. 7, *ca.* $\frac{2}{5}$. After Vouga.

The pottery forms are many, the decoration largely geometric, the designs both incised and painted, the lines for the most part curvilinear (Fig. 392). Zones are sometimes filled in by a frieze of animal figures. The pottery of La Tène III is remarkably homogeneous. The vases made of fine paste were turned on the wheel. Those for common use were of coarser paste and were still made by hand. The paste was gray, black, brown, or reddish. The painted designs occupied a broad zone. The paste of painted pottery is hard and homogeneous; globular bowls were among the favorite forms (Figs. 393 and 394).

A curious development in the line of plastic decoration is to be noted in the so-called face urns (*Gesichtsurnen*), with relatively ample equatorial dimensions and the human visage partly in relief near the brim. Face urns are found principally in Posen, Pomerania, and Silesia.

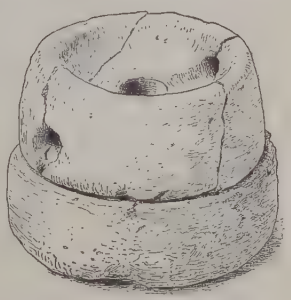

FIG. 391. STONE HANDMILL FROM THE TUMULUS OF CELLES. EPOCH OF LA TÈNE.

After Pages-Allary.

*Money.*—Greek coins were introduced into Gaul by way of Marseilles. At Auriol, near Marseilles, a cache of 2,130 silver coins was found in 1867. They are archaic Greek in style and anepigraphic. Similar caches of small coins have been found at Volterra in Etruria, at Velia in Lucania, and on the Spanish coast. Local imitations of eastern Mediterranean models were fairly faithful at first but underwent progressive degeneration in time. The result is that the more recent Celtic coinages are more barbaric in appearance than the earlier. A striking instance of this is seen in the imitation of coins from Thasos by the Celts of the lower Danube, published by Forrer. Marseilles coins were soon copied by the Celts of the Rhône valley and southeastern Gaul. On one series the lion figures, on another the bull.

The so-called *Regenbogenschüsselchen*, abundant in Bohemia, southern Germany, and Switzerland are to be reckoned among the most barbaric moneys employed by the Celtic and Germano-Celtic tribes. They are cup-shaped pieces made of gold or electrum

(an alloy of gold and silver), either plain or marked by some rudimentary symbol.

According to Déchelette, gods are seldom, if ever, represented on Gallic coins. The prototypes of all these coins, whether of bronze, gold, or silver, came from centers of Greek culture. After the Romans had established themselves in southern France about 120 B.C., the Gauls began to take for models the silver coins struck at Rome. The most important series is the one known as "cavalryman."

Greek and Latin inscriptions are often found on Gallic coins,

FIG. 392. PAINTED CLAY VESSELS OF THE EPOCH OF LA TÈNE I.

The two small vessels are from Beine (Marne), France; the large one is from Prunay (Marne).

especially on those of the last 100 years B.C. Gallic coins are never found in sepultures of La Tène I.

*Dress and Ornament.*—All that is known of La Tène clothing has been gathered from texts and from representations of barbarians in antique art. According to Diodorus of Sicily, the Gauls wore a tunic and trousers, also a mantle or cloak (*sagum*). The garments were of many colors; the richer ones were brocaded or embroidered in gold. Barbaric warriors were represented by Greek artists as going to combat nude except for the mantle.

Taste for articles of adornment was gratified in many ways. The men were fond of richly ornamented weapons, in addition to such personal ornaments as bracelets and rings. Beads, bracelets,

belts, earrings, and pendants were worn by the women. The principal elements entering into articles of adornment were bronze, red enamel, and coral.

La Tène was the epoch *par excellence* of the fibula, generally of bronze or iron, rarely of gold. The pin, spring, and arch of the fibula were made of a single piece of wire. The head of the arch is next to the spring; to its foot the clasp is attached. The spring is always bilateral. In the classification of fibulae much stress is laid on the foot, or rather the recurved appendage extending beyond the clasp. Already in the first phase it may be developed enough to touch the arch; with the second phase it not only touches but is actually fastened to the arch by means of a ring; finally, during the third phase appendage and arch are of one piece (Figs. 395 and 396). The ring in vogue during the second phase is either wholly suppressed or else retained as a rudiment for the purpose of ornamentation.

FIG. 393. PAINTED CLAY VESSEL FROM THE NECROPOLIS OF HAULZY.

This vase illustrates the geometric design so widely used in La Tène III. After Goury.

A torque is a rigid metallic necklace, twisted or not as the case may be. It appeared first in the Bronze Age but was in much greater favor during the Epoch of La Tène. It was worn by both sexes, by warriors presumably as a mark of honor. The dying Gaul in the Capitoline Museum at Rome wears one; it is also seen on Gallic coins in which the busts of warriors figure. But it does not seem to have been worn by warriors prior to the third century B.C., the date when it ceased to be worn by women. The torques worn by women were of bronze or gold, rarely of iron (Fig. 397).

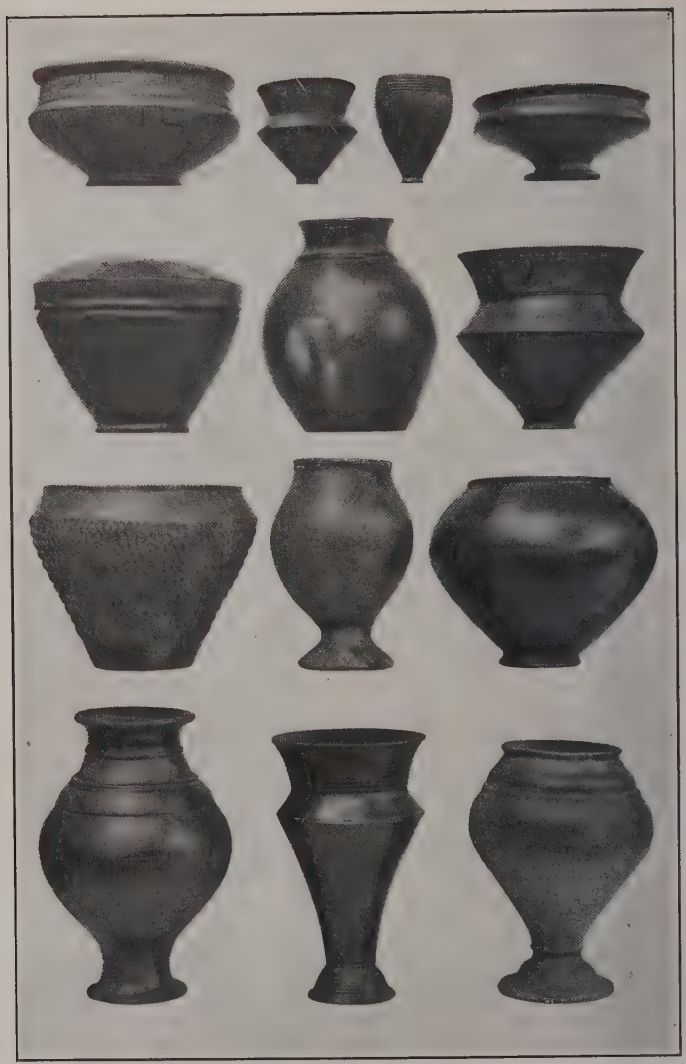

FIG. 394. LA TÈNE POTTERY OF THE THIRD PHASE, CHIEFLY FROM THE MARNE.
Morel collection, British Museum. Photograph from the British Museum.

Belts, like torques, were inherited from the Bronze Age. During the first phase at least of the Epoch of La Tène, warriors wore belts of leather or cloth fastened by a bronze clasp. The openwork of the clasp is derived from the Greek palmette and often takes on stylistic animal forms. A character common to La Tène belt buckles, and distinguishing them from those of earlier epochs, is that they are always of cast instead of hammered bronze.

The second phase of La Tène witnessed a departure in the matter of female belts—the chain belt of cast bronze. There are many varieties, susceptible, however, of being grouped under two heads: (1) chains composed almost exclusively of circular rings;

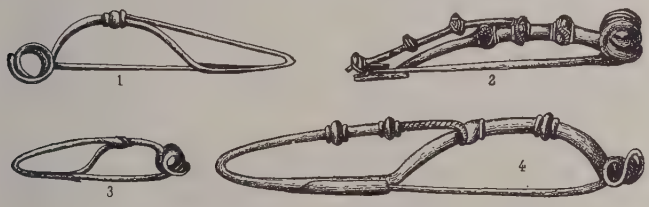


Fig. 395. Bronze fibulae dating from La Tène II.

No. 1, from Vevey, Switzerland; No. 2, from Dühren, Baden, Germany; No. 3, from Sommesous (Marne), France; No. 4, from Sweden. Scale, ½. After Déchelette.

(2) those in which the rings alternate with oblong decorated bars. The chain belt is provided with an attractive pendant. The belts were evidently worn low, prototype of the present fashion, for they are found at the level of the pelvic bones (Fig. 398).

Bracelets were highly esteemed by the women of La Tène, especially during the first and second phases. The men rarely wore either bracelets or torques. Nearly all the bracelets are of bronze. They as well as the torques are sometimes ornamented with red enamel (Fig. 399). A small percentage are of iron, and only a very few of gold or silver. Lignite, schist, and jet were used sparingly in the manufacture of bracelets. Déchelette describes nine different varieties dating from the first and second phases. Some are closed in one piece; some are open; others are open but provided with means of fastening the two ends together.

Attractive glass bracelets have been found in La Téne sepultures of Switzerland. Some were colored yellow by means of sul-

phur, others dark blue by means of cobalt. A sepulture at Frauenfeld (Langdorf) contained a bronze chain belt with triple pendant, two bronze fibulae with bilateral springs, a spiral bracelet of bronze, and two bracelets of yellow glass. Tomb No. 2 from the same cemetery contained a belt similar to the above, two iron fibulae, and a bracelet of yellow glass. Tomb No. 1 at Frauenfeld contained a gold coin, three bronze fibulae, fragment of a bronze bracelet, two amber beads, and a bracelet of cobalt glass.

Finger rings were much worn throughout the Epoch of La Tène. Most of them are of bronze but gold, iron, and silver were also employed in their manufacture. Women wore them by preference on the right hand, sometimes on both hands. They are

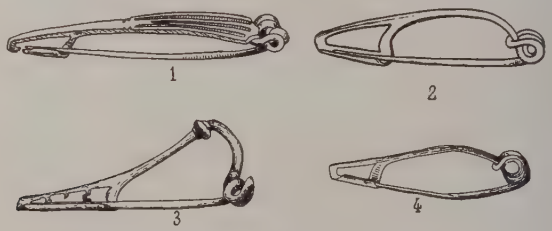


FIG. 396. BRONZE FIBULAE DATING FROM LA TÈNE III.

Nos. 1 and 2, from Stradonitz; No. 3, from Carinthia; No. 4, from Carthage. Scale, ½. After Déchelette.

occasionally found in sepultures of men of rank. Swiss sepultures have yielded most of the finger rings, those at Münsingen being particularly rich. It was in Switzerland that the ring with setting first made its appearance (third phase).

The earrings have all been found in the sepultures of females. They were made of bronze as well as of gold. The crescent-shaped earring of La Tène is not unlike a similar type dating from the Hallstatt Epoch.

Toilet utensils dating from the Epoch of La Tène, assembled in trusses as well as singly, have been found in many sepultures. The toilet truss was already in favor during the Hallstatt Epoch. Tweezers for pulling hair and scratchers were more in use than was the *curette* for ears and nails. They were made either of bronze or iron and occur in the graves of both men and women. Certain curious bronze spoons, shallow, with short handles, found

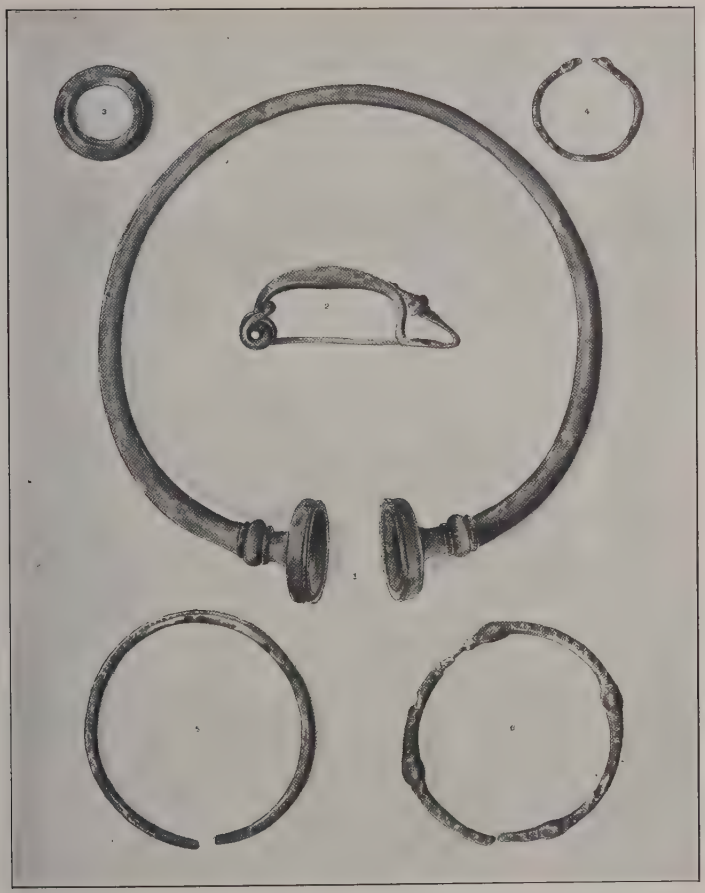

FIG. 397. ORNAMENTS OF LA TÈNE I FROM AN INCINERATION BURIAL AT HAULZY, MARNE, FRANCE.

No. 1, torque; No. 2, fibula; No. 3, ring; Nos. 4, 5, 6, bracelets. After Goury.

both in the British Isles and on the Continent, are supposed to have been employed by women in the preparation of paints or pomades.

La Tène razors were no longer made of bronze but of iron. Their frequent association with the sword proves that warriors

shaved at least a part of the face. Diodorus of Sicily speaks of Gauls with shaven cheeks but with long, drooping mustaches. The razors of the epoch are easily distinguishable from the knives by their shortness and the greater curvature of their blades.

An invention of no mean importance must be credited to the culture of La Tène. Scissors made their appearance for the first time during this epoch. They are the prototype of the sheep shears still in use—a bar of iron terminating at each end in a blade, and bent so as to bring the edges of the two blades together and hold them in position under pressure. One of the earliest Gallic examples is that found in a male sepulture at Montfercaut (Marne), associated with an umbone typical of La Tène II. Examples dating from La Tène I have been found in sepultures of three warriors at Montefortino near Ancona. In southern Germany they are often associated with razors in sepultures of La Tène II. Early explorations at La Tène yielded a dozen pairs of scissors belonging to the third phase (Fig. 400). Scissors were evidently used primarily for cutting hair and beard as well as cloth.

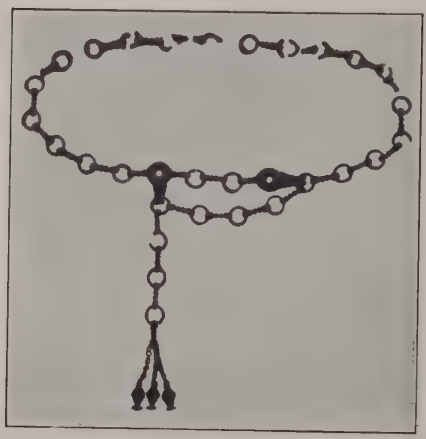

FIG. 398. WOMAN'S BELT OF BRONZE, DATING FROM LA TÈNE II.

From the cemetery at Vevey, Switzerland. After Naef.

With the exception of Stradonitz, bronze combs are very rare during the Iron Age. The scarcity of combs in the sepultures of the Hallstatt and La Tène Epochs is accounted for by assuming that wood was used largely in their manufacture. Combs for the hair are not to be confounded with a somewhat similar implement used by weavers. The bone and ivory combs found at Montefortino had two rows of teeth; the rule, however, was a single row. The back was often decorated with incised patterns or openwork. A

fine collection of weavers' combs made of horn and bone was found in the pile village of Glastonbury.

The mirror was but little used in central and western Europe before the third phase of La Tène, although it was known in Greece and Egypt as early as the Bronze Age. The few mirrors of La Tène I and II found north of the Alps were importations

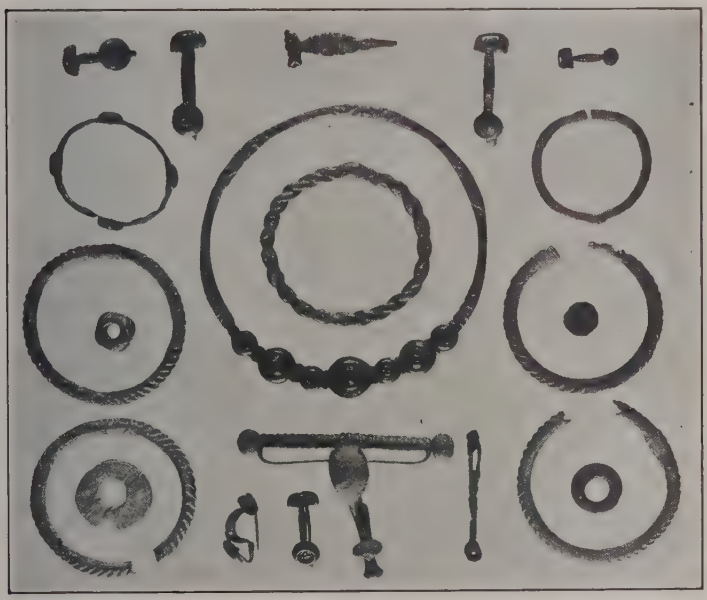

FIG. 399. BRONZE ORNAMENTS FROM ANDELFINGEN, NEAR ZURICH, SWITZERLAND. EPOCH OF LA TÈNE.

The torque and one of the bracelets are decorated with red enamel. Photograph by Viollier.

from the south, but by the close of the Iron Age, fine examples were being manufactured as far away as the British Isles. In the time of Pliny, Brindisi was an important center for the manufacture of the best quality of bronze mirrors.

*Religion and Art.*—La Tène amulets are many and varied. Some are survivals from preceding epochs; others appear for the first time north of the Alps. Perforated teeth of animals and even

FIG. 400. SCISSORS AND RAZORS FOUND AT THE TYPE STATION OF LA TÈNE.

Nos. 1–3, scissors; Nos. 4–6, combinations of scissors and razors originally enclosed in a toilet case; Nos. 7–13, razors. Scale, ¼. After Vouga.

of man were worn alike by Paleolithic hunters and Neolithic herdsmen; so also were perforated shells. During the Iron Age there was a much wider range of materials to select from, including

metal, glass, coral, etc. Teeth, bone, and shells were therefore used sparingly. Instead of a necklace composed wholly of teeth, or of teeth and shells, the necklace of La Tène is composed of divers elements. A necklace found in one of the tombs at Varilles (Marne) was made up of one hundred coral beads, one amber bead, one shell, one clay spindle whorl, one tooth of the wild boar, and a piece of human bone. Teeth of the wild boar were much prized as amulet pendants; some are carefully mounted in bronze with a ring for suspension. Wheels strung on wire were worn as pendants; they are also found attached to fibulae. Both wheels and simple rings abounded during La Tène III and served, not only as amulets, but also as media of exchange; the usual number of spokes is either four or eight. The wheel was sometimes attached to the torque as a sort of pendant.

Pierced rondelles cut from the human cranium have been found in a number of La Tène sepultures. The one found at Bergères-les-Vertus (Marne) has three perforations. Another found at Somme-Bionne (Marne) is in the form of a trefoil; each of the circles composing the trefoil is perforated. The amulet was suspended by means of a metal wire passing through one of the perforations.

The cult of the ax also persisted. Amulet axes are reported from a number of sepultures, including the tumuli of Motte-Saint-Valentin (Haute-Marne) and Mercey-sur-Saône (Haute-Saône).

The new element in amulets is the appearance of entire figures of man and of animals, as well as of parts thereof. The human figurines for the most part represent the male sex. They are suspended by means of a ring on the head or back. Among amulets representing only parts of the human form, the foot occurs most frequently. It is found especially in Czechoslovakia, Tyrol, the Caucasus, and Italy. The animals most favored for amulets are the horse, wild boar, ox, and ram. These are the animals that are so frequently figured on ceremonial vases of the Hallstatt Epoch.

Astral symbols often play a part in the ornamentation of La Tène weapons. Examples have been reported from Kastel near Mainz, from Allach (Bavaria), and from near Peschiera on Lake Garda (Verona). Kossina describes a lance head from a

FIG. 401. THE CHARIOT BURIAL OF LA GORGE-MEILLET, MARNE, FRANCE. FULL LENGTH SKELETONS AT TWO LEVELS. PHOTOGRAPH FROM THE BRITISH MUSEUM.

later period, found at Müncheberg in Altmark (Brandenburg), which is ornamented, not only with the crescent, but also with the swastika and triskele. The swastika is also engraved on a lance head from the station of La Tène and on a helmet from La Gorge-Meillet (Marne); the triskele, on a helmet from Berru (Marne).

One of the reasons for the exceptional value attached to amber and coral during the Iron Age and even earlier was belief in their talismanic virtue. Necklaces composed wholly or in part of amber are frequently found in La Tène tombs, particularly in Liguria and on the Adriatic coast. As many as 1,300 amber beads were found in 113 tombs at Jezerine, Bosnia. The sepultures of the Epoch of La Tène in the vicinity of Ancona are also rich in amber. Like amber, coral was worn not only as an ornament, but also as an amulet. When it became scarce and difficult to obtain, the Celts had recourse as a substitute to enamel of about the same reddish tint.

The manufacture of glass came to be an industry of considerable importance during the Epoch of La Tène. Beads, pendants, and bracelets of glass were more in vogue than ever before. Among glass pendants, the human mask with excessively large eyes was an effective charm against the evil eye. Fine examples of this sort strung on a bronze wire were found in 1912 in a sepulture of the necropolis of Saint-Sulpice (Vaud). A similar glass mask with prominent eyes was found in the necropolis of Vitry-les-Reims (Marne). The eye-shaped spots and nodules found so frequently on glass beads must have served the same purpose. A typical talismanic necklace, composed in part of glass beads of this sort and in part of various amulets, comes from a tomb at Kertsch in the Crimea.

There is ample ground for believing that there was a magic number during the Epoch of La Tène. It is seen in the tendency to repeat the same motive three times, for example, in the triskele and in the triple perforation of cranial amulets (sometimes in the shape of a trefoil). It is often by threes that beads and rings are found suspended to torques.

*Sepultures.*—The prevailing mode of burial during the Hallstatt Epoch was inhumation under tumuli. This practice con-

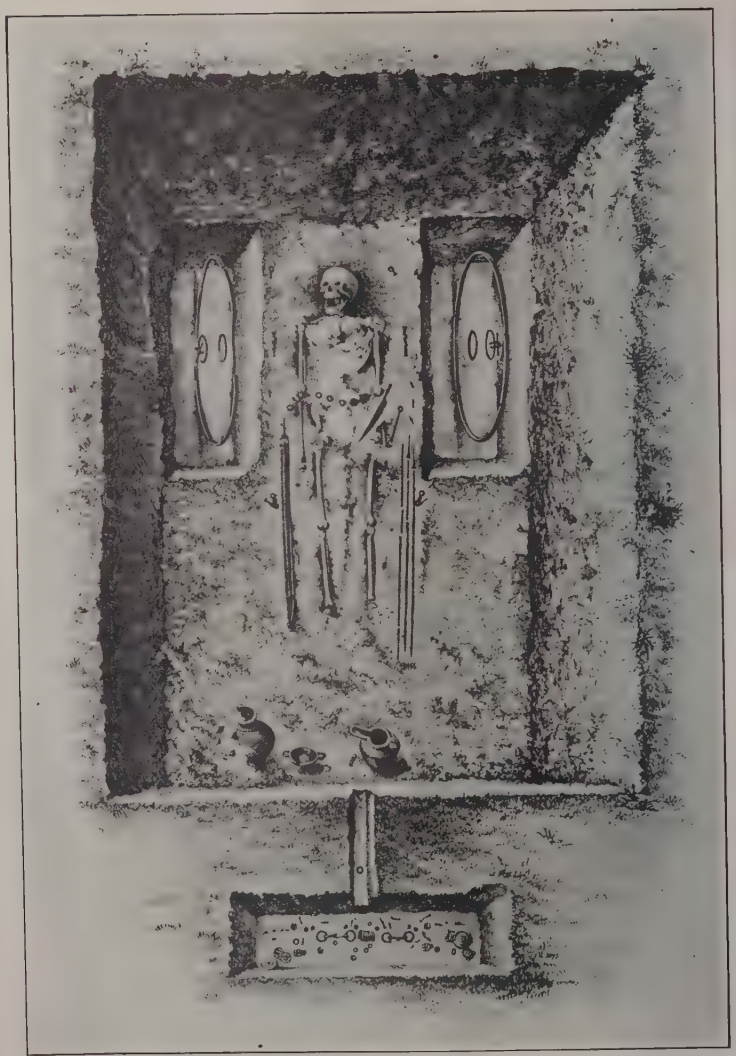

FIG. 402. THE CHARIOT BURIAL OF SOMME-BIONNE, MARNE, FRANCE.

Spits and a great carving knife can be seen beside the skeleton in addition to the usual burial accompaniments. Photograph from the British Museum.

tinued during the early phases of the Epoch of La Tène, especially where the older culture had taken a firm hold. This is particularly true of eastern France, southern Germany, and Czechoslovakia. Beginning with La Tène II, the tumulus becomes more and more rare, being superseded first by flat inhumation tombs and later by incineration tombs. Flat tombs have this advantage, that they are not so liable to be detected and ransacked by subsequent peoples.

Most of our knowledge of the arts, industries, customs, and beliefs of the culture of La Tène is based on what has been found in the cemeteries. The center of La Tène culture was the region stretching from the Rhine and the Danube on the east to the Seine and Saône on the west. About two hundred La Tène necropoli have been located in the department of the Marne alone. Some of these are very large, each containing from one hundred to one thousand sepultures, and testify to a relatively dense population. Explorations of these necropoli have been carried on intermittently since 1860, enough of the work being methodical to render it possible to arrive at certain general conclusions.

Inhumation prevailed almost without exception during La Tène I and II. Chiefs and noted warriors were interred with their chariots; some fifty chariot sepultures have been found in the one department. The high personage was buried in his uniform accompanied by his chariot, sword, javelins, lance, etc. The chariot burials nearly all belong to La Tène I. The type is almost constant. The corpse rested full length in a rectangular pit at the level of the chariot axle, small pits being sunk deeper to accommodate the wheels. Generally, in addition to the rectangular pit, there was a longitudinal ditch to receive the chariot tongue, and at its end a transverse ditch in which were deposited bridle bits and harness. About the body were placed vessels which contained food and drink, various weapons of defense as well as offense, and ornaments.

One of the best known chariot burials is that of La Gorge-Meillet (Fig. 401). In it were found bronze *œnochoës* imported from southern Italy. Provisions for the dead included wine from Italy (grape culture was still unknown in the Marne), beef, pork, hare, pigeon, duck, frog, etc. Spits and a great carving knife

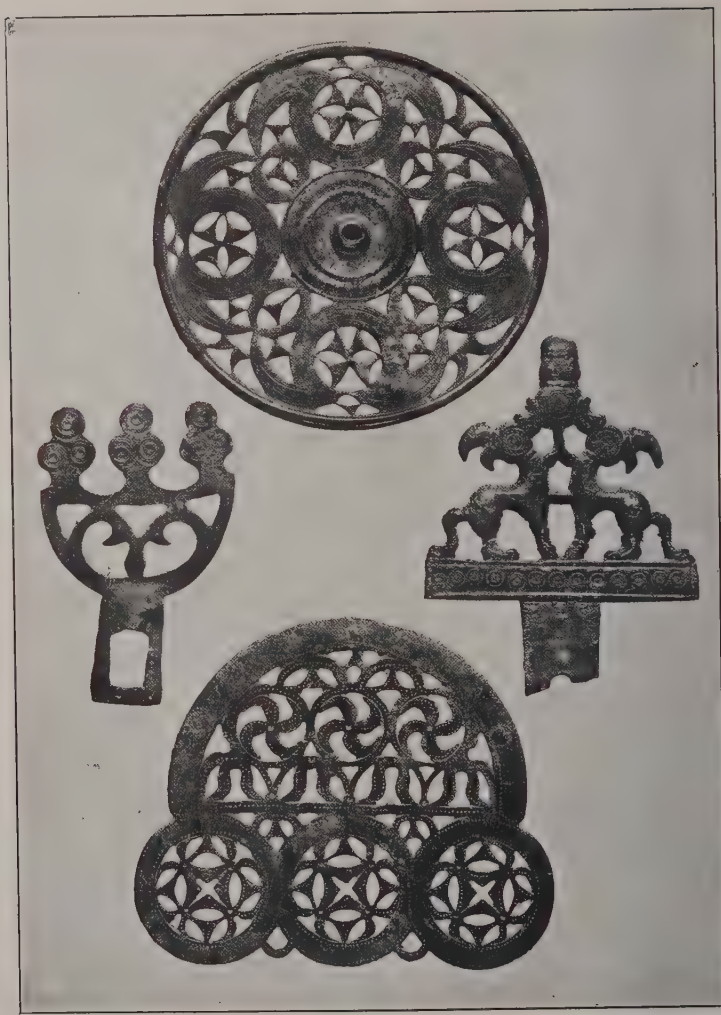

FIG. 403. BRONZE HARNESS TRAPPINGS FROM THE SOMME-BIONNE CHARIOT BURIAL.
Photograph from the British Museum.

were found in the chariot burial of Somme-Bionne (Figs. 402 and 403). A ditch usually surrounds these burials, apparently a souvenir of the Bronze Age custom of placing a circle of stones around their sepultures.

The chariot of the Epoch of La Tène was a light, wooden, two-wheeled vehicle generally drawn by two horses and providing place for the driver and one warrior. The wooden tongue of the chariot was supported by means of a wooden yoke; only the accessories were of metal, for the most part of iron. The diameter of the wheel was 80 to 95 centimeters (31.5 to 37.4 inches), and the distance between wheel tracks varied from 1.25 to 1.35 meters (4.1 to 4.4 feet). The ornamentation of both chariot and harness was in part of openwork bronze. The wood of the chariot was no doubt painted in rich colors.

None of the wooden yokes for horses (with the possible exception of the smaller one from La Tène) have been preserved, though their metallic ornaments have been found. The other wooden yoke thus far recovered is one for oxen, recently found at the station of La Tène. There is an arch near each end, and two slits for the insertion of the leather

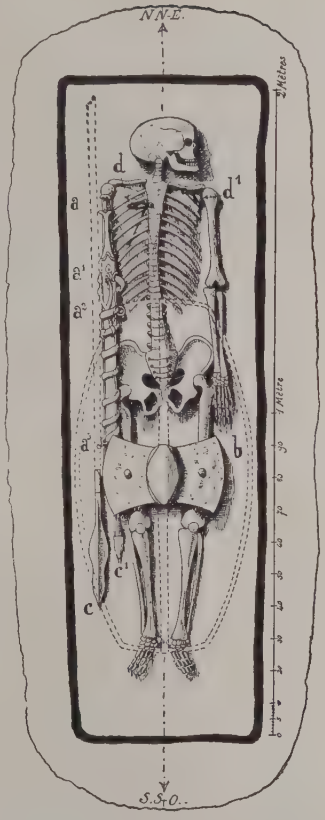


FIG. 404. SEPULTURE OF A WARRIOR FROM THE CEMETERY OF VEVEY, SWITZERLAND.

*a*, $a^1$, $a^2$, $a^3$, iron scabbard resting on and completely covering the right arm; *b*, the iron umbone of the shield which covered the lower part of the body and the legs but which has since decayed (shown by dotted outlines) leaving only the umbone; *c*, iron lance head (point down and under the shield) with only a portion of the wooden shaft preserved (the rest indicated by dotted lines); $c^1$, the iron chape of the lance (likewise point down). The lance had been broken at the time of the inhumation; *d*, $d^1$, fibula of iron at each shoulder. After Naef.

strap by means of which the yoke was made fast to the horns of the ox. A similar method of attachment is still in vogue in some parts of France.

FIG. 405. MALE SKULL OF LA TÈNE II FROM MÜNSINGEN, BERNE.

The cranium has two parietal trepanations neither of which had healed. Photograph by Tschumi.

The bridle mouthpieces found in chariot burials are sometimes of bronze, sometimes of iron, and are of the broken-bit variety. In some cases the metal bears enamel ornamentation. The ornamentation, more ample on one side than the other, points to the use of these bridles *de luxe* on paired horses. Spurs occur singly; we may infer, therefore, that it was the custom to attach a spur to one foot only.

Inhumation, but without chariot accompaniment, was the rite during La Tène II. With the male were buried his weapons and ornaments; with the female, a bronze torque, bracelets, anklets, fibulae, beads of amber, coral, and glass. Gold objects were extremely rare, being confined to a few male sepultures. Ceramic vases are numerous, as they were during La Tène I. A small supply of charcoal, needful in the preparation of food, is sometimes found next to the skeleton.

Bronze Age burials were sometimes in the hollowed trunk of a tree. The superiority of Iron Age tools made it possible to construct wooden coffins composed of slabs held together by means of iron nails after the fashion persisting to-day. Evidence of this has been noted in eastern France, at Vevey and Münsingen in Switzerland, and at Langugest in Czechoslovakia. The custom was presumably borrowed from Etruria, where wooden coffins were employed in the necropoli of Montefortino and Bologna.

The presence of multiple burials in the same sepulture may find its explanation in the testimony of Caesar that the death of an important individual was accompanied by the sacrifice of his loved ones and slaves.[1] There is every indication that the burials took place at one and the same time. Of the sixty-four tombs in the cemetery of Thuizy (Marne), twenty-eight were double burials—a male and a female; four contained three skeletons each. Ac-

FIG. 406. DOUBLE BURIAL AT MÜNSINGEN.
The skeletons are those of an adult female and a youth of La Tène I–II. Photograph by Tschumi.

cording to Foudrignier, the males were all adult, whereas in some cases the accompanying female was adolescent. In a tomb at Bouverets (Marne) there were four headless skeletons side by side, recalling the Gallic custom of decapitating enemy captives and nailing the heads to houses as trophies.

During the third phase of La Tène culture in eastern France, incineration was the burial rite. The ashes were deposited either in urns or simply in the earth, accompanied by provisions and articles of personal use or adornment. Incineration tombs are poorer in artifacts than those where inhumation was practiced; besides, the objects are as a rule injured by fire.

In some parts of France the custom of burial under tumuli continued uninterruptedly. The tumuli in some cases date from the Hallstatt Epoch, the burials of the Epoch of La Tène being intrusive; in others, the tumuli were built expressly for La Tène burials but on the same general plan as were the Hallstatt tumuli.

For the French Alpine provinces the type sepulture is well represented by that of Peyre-Haute (Hautes-Alpes), discovered by Chantre and preserved in the Natural History Museum at Lyons. The extended skeleton of a female lay in a rectangular pit lined with rough stones. The inventory of objects found therewith comprises: a necklace consisting of thirty-eight beads—seventeen glass, eleven bronze, and nine amber; twenty-six bracelets on the right arm and six on the left; several bronze fibulae and one of iron; forty-six conical bronze buttons equidistant and forming a row that reached from the head to the feet. These buttons were evidently attached to a long tunic or mantle. The sepulture is dated by means of the fibulae, which belong to the type of La Tène II.

La Tène culture is traceable by means of the sepultures, not only over the eastern half of France, but also over large portions of Belgium, Switzerland, Germany, Austria, Hungary, Czechoslovakia, Russia, Scandinavia, the British Isles, Spain, Portugal, Italy (Rome sacked in 390 B.C.), and Greece (Delphi pillaged in 279 B.C.). Rich sepultures belonging to the first phase of La Tène culture have been explored in the region of the middle Rhine. They are generally under tumuli and represent for the most part the incineration rite. Chariot burials are rare. The one at Waldalgesheim, discovered in 1869, is noted for its mag-

nificent torques and bracelets of gold. It also contained a situla and *œnochoë* of Italo-Greek bronze, a bronze figurine of a horse, the iron tire of a chariot wheel, a bridle bit and harness trappings.

The Rhenish flat inhumation tombs of the second phase are much less rich than those of the first phase. One of the most carefully studied necropoli of La Tène II in southern Germany is that of Steinbichl, northwest of Manching. The forty sepultures explored here resemble those of the same phase in eastern Gaul. Sepultures of La Tène III in southern Germany are for the most part incineration sepultures. In Silesia both incineration and inhumation were practiced throughout the Epoch of La Tène; in Scandinavia incineration was the prevalent rite. La Tène sepultures of Czechoslovakia resemble those of southern Germany and eastern France.

A necropolis dating from La Tène II at Vevey, Switzerland, was carefully explored by Naef. Many of the bodies had been placed in wooden coffins. In several cases a small pile of charcoal was found between the tibiae just below the knees. Thirty-one sepultures were explored at Vevey (Fig. 404); only two contained swords. At Münsingen 217 sepultures were explored and found to be similar to those at Vevey. Two of the male crania from Münsingen had been trephined after the fashion in vogue during the Neolithic Period, one of them twice (Fig. 405). Some of the sepultures at Münsingen were double (Fig. 406). Very little pottery is found in Swiss La Tène sepultures. Sepultures dating from La Tène III are rare in Switzerland. The recent explorations of the Marquis of Cerralbo at Arcobriga and Aguilar de Anguita prove that La Tène culture had a firm foothold in Spain.

As early as 1815–17 important La Tène sepultures were explored in East Reading, Yorkshire, England, by the Rev. E. W. Stillingfleet. Further explorations of the same site were made by Canon Greenwell about 1876. The sepultures were under low tumuli. Most of the skeletons were flexed after the fashion of Neolithic burials. Three of the sepultures explored by Stillingfleet were described in detail:

1. *King's Barrow.*—The skeleton of a warrior inhumed with shield, chariot, a pair of horses harnessed, two wild boars.

2. *Queen's Barrow.*—The flexed skeleton of a female inhumed with

gold ring, necklace of about one hundred glass beads, amber, bronze bracelets, toilet tweezers, etc.

3. *Barrow of the Charioteer.*—Skeleton of a warrior with two bridle bits, a chariot wheel, an umbone of a shield, and two staghorn pendants (found on the breast).

In one of the tumuli explored by Greenwell, a female skeleton lay in a circular pit, and near it had been deposited two heads of the domesticated pig. An iron mirror, two chariot wheels, two bridle bits, and harness trappings were found with the skeleton.

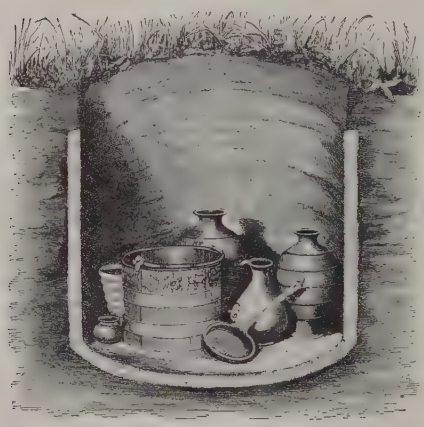

FIG. 407. INCINERATION BURIAL AT AYLESFORD, KENT, ENGLAND.

In the pit were a number of bronze and earthenware vessels of the Epoch of La Tène. The pail contained three fibulae and burnt human bones. After Sir Arthur Evans.

Tumuli known locally as Danes' Graves are numerous in Yorkshire. Sixteen tumuli at Pockthorpe Hall near Kilham were explored in 1897. All the bodies had been flexed. One of the tumuli covered a chariot burial and contained the skeletons of two adult males. The Yorkshire tumuli belong to an early phase of the La Tène culture.

La Tène sepultures have been found in several other counties, including Cornwall, Derby, Devon, Kent, Gloucester, and Stafford. The incineration sepultures of Aylesford (Kent) belong to a late phase of La Tène. The ashes were placed in pottery vessels resembling cinerary urns of La Tène III found in Normandy. The burials are in small round pits less than a meter in depth. One of the richest of these incineration burials is reproduced in Figure 407.

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# CHAPTER XV

## PHYSICAL CHARACTERS OF POST-PLEISTOCENE MAN

The cultural evolution of man is one thing; his physical evolution is quite another. In its broad outlines we have a more or less faithful history of cultural evolution from its earliest phases to the present time in so far as the history can be based upon imperishable materials alone. The least perishable of all materials entering into the warp and woof of cultural evolution is stone; the student of prehistoric archeology is indeed fortunate that prehistoric man was so largely dependent upon stone, especially flint, in his long uphill fight for mastery over his environment.

The student of man's physical evolution is not so fortunate, because no part of man's anatomy can compare with flint or stone in imperishability. The only part that is not subject to almost immediate decay under ordinary circumstances is the skeleton; and it can be preserved through long periods of time only under exceptional conditions.[1] Thus it is that in the physical evolution of man we are not only dependent upon the osteologic record but even this record is woefully fragmentary. This, however, should not deter us from making the most of the material at our disposal.

Given a certain number of skeletons and parts of skeletons dating from the late Paleolithic Period on the one hand, and on the other the races that inhabit the earth to-day, the problem is to connect the two by making to live again the races that lived during the early part of the post-Pleistocene. This can be done, at least to a considerable extent, by a proper study of the skeletal remains belonging to the various intervening epochs—Azilian-Tardenoisian, Neolithic, and the Ages of Bronze and Iron. Fortunately most of these epochs furnish the student with a much greater wealth of

[1] For example, the Paleolithic caves about Brive in Corrèze are abundantly implementiferous, but they contain no fossil bones whatsoever because of the sandstone formation in which the caves occur.

osteologic material upon which to base his conclusions than he had from any of the preceding epochs.

### Azilian-Tardenoisian Man

The races of the late Paleolithic Period were more or less differentiated, yet all could be referred to the species *Homo sapiens*. The types can be designated as Grimaldi, Cro-Magnon, and Chancelade; all were dolichocephalic. The Azilian-Tardenoisian Epoch has left a rather small but interesting exhibit. At the type station

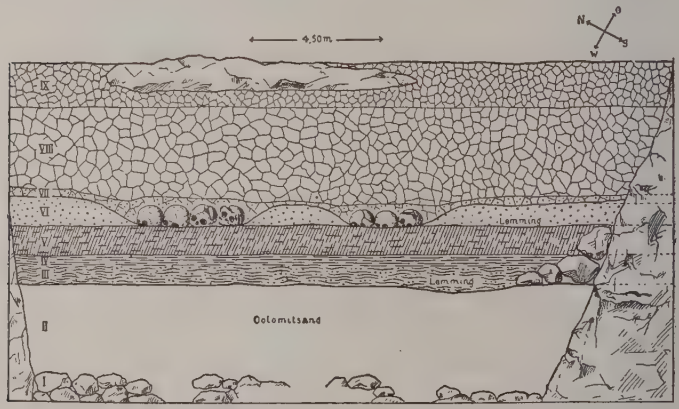


Fig. 408. Section of the cave deposits of Grosse Ofnet, Bavaria.

I, rock; II, dolomite sand; III, Aurignacian horizon; IV, Upper Aurignacian; V, Lower Solutrean; VI, Upper Magdalenian; VII, Azilian; VIII, Neolithic Period; IX, Bronze and Iron Ages (see Appendix I). After R. R. Schmidt.

of Mas d'Azil a few human bones, richly stained by red ocher, were found in the Azilian horizon, but they were not complete enough to be of service in the determination of racial characters.

The osteologic material from a remarkable cave between Holheim and Utzmemmingen in Bavaria near the Württemberg frontier, known as Grosse Ofnet, deserves special study (Fig. 408). The cave had been inhabited intermittently from the early Aurignacian Epoch to the Middle Ages. In the fifth relic-bearing horizon from the bottom, R. R. Schmidt found important Azilian-Tardenoisian sepultures, consisting of two pits, each filled with a nest of crania,

accompanied by their respective lower jaws. The crania were arranged in such a manner as to face the west. The entire mass was deeply stained by red ocher. In all there were thirty-three skulls, twenty-seven in the large pit and six in the small (Fig. 409). Those of women and children predominated, and these were ornamented with perforated shells and canines of the red deer, as was

FIG. 409. THE SMALL NEST OF HUMAN CRANIA AS DISCOVERED IN THE CAVE OF GROSSE OFNET, BAVARIA.

After R. R. Schmidt.

the case at Mas d'Azil. With the exception of a few cervical vertebrae, there was no trace of other parts of the skeleton.

Of the thirty-three crania it was possible to restore twenty; these include a mixture of types with a cephalic index ranging from 70 to 89. The dolichocephalic crania also have long faces, resembling in this respect the Mediterranean type. The brachycephalic crania represent the earliest stock of *Homo alpinus*.

The kitchen middens of Mugem, Portugal, have yielded a relative abundance of human skeletal remains associated with a Tardenoisian industry. Two types are noted, one dolichocephalic, the other brachycephalic. The dolichocephals, much the more numerous, are rather short of stature, about 1.60 meters (5 feet 3 inches), have small cranial capacity, and rather long face in harmony with the long cranium. These dolichocephals represent what de Quatrefages called the race of Mugem; they are more nearly related to early *Homo mediterraneus* than to the race of Cro-Magnon. The brachycephalic type at Mugem is represented by only two crania.

## Neolithic Man

While more homogeneous than the population of present-day Europe, a survey of the numerous skeletal remains left by the Neolithic populations of Europe reveals the presence of the three principal head types (dolichocephals, brachycephals, and mesocephals), with at first a preponderance of long heads. As early as 1896, Salmon was able to list no fewer than 688 crania from France alone. Of these, 58 per cent were long heads, 21 per cent broad heads, and 21 per cent intermediate or mesocephals. Before the close of the Neolithic Period the proportion of brachycephals had largely increased, due to the spread of *Homo alpinus* which first appeared in the Azilian Epoch at Ofnet.

The Neolithic dolichocephals evidently come in part from the late Paleolithic peoples; this is especially true of certain regions. Long ago Broca called attention to the resemblance between the Cro-Magnons and the numerous Neolithic skeletons found by Prunières in the caves of Lozère. To a lesser extent the same thing may be said of the skeletal remains found by the Baron de Baye in the artificial Neolithic caves in the department of Marne. Here, however, there is a sprinkling of brachycephals.

There are two kinds of Neolithic dolichocephals, the long-faced or harmonic, and the short-faced or disharmonic. The latter are derived from the Cro-Magnons; the harmonic type appeared with the Azilians. Both kinds appeared not only among the Neolithic population of France and Belgium, but also in the Iberian peninsula.

Verneau found Neolithic dolichocephals of the Cro-Magnon type in the provinces of Oviedo, Segovia, and Andalusia. According to Jacques, the skeletal material in the collections gathered in southeastern Spain by the Siret brothers included both harmonic and disharmonic dolichocephals as well as brachycephals. Taking Spain and Portugal together, the harmonic dolichocephals (*Homo mediterraneus*) seem to have been dominant in Neolithic times.

Switzerland presents the peculiarity of an early dominant brachycephalic population. Toward the middle of the Neolithic Period, mesocephalic and dolichocephalic elements come by degrees more and more into evidence. According to Schenk, the dolichocephals exceed in numbers by the close of the Neolithic Period. He found in the Neolithic sepultures of Chamblandes near Lausanne a long-headed race recalling the Cro-Magnon type but short of stature and with certain negroid characters suggesting kinship with the Grimaldi race. Toward the close of the Neolithic Period in Switzerland, Pittard notes the presence of a tall, dolichocephalic race with characters of *Homo nordicus*.

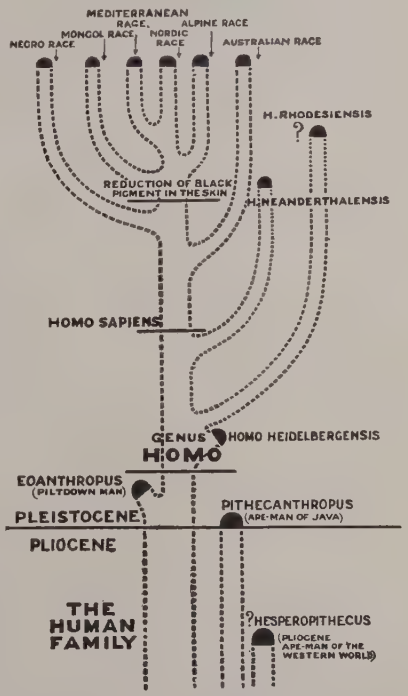


FIG. 410. CHART OF THE HUMAN GENEALOGICAL TREE.

The common parent trunk, still unrevealed, is to be sought in records older than the Pliocene Epoch. After G. Elliot Smith.

The Neolithic tumuli (*kourganes*) of Poland and southwestern Russia contain skeletal remains of a tall long-headed race. The

oldest known races of central and northern Russia are of a similar type. In Sweden, Norway, and Denmark most of the Neolithic sepultures were left by a tall long-headed race, brachycephals being comparatively rare. The same may be said of Neolithic races that inhabited Germany, Czechoslovakia, Austria, and Hungary. According to Schliz, there is in southwestern Germany not only a sprinkling of Neolithic brachycephals, but also of the Mediterranean type.

British barrows (tumuli) are found to vary directly with the head types contained therein. The Neolithic long barrows contain sepultures with long crania. On the other hand, round barrows of the Bronze Age yield round or brachycephalic crania. Sir William Turner's studies in Scotland revealed a dolichocephalic Neolithic population long of face but rather short of stature and presumably related to *Homo mediterrancus.* The round-headed, broad-faced, Bronze Age invaders of Britain do not appear to have left a lasting impression on the physical make-up of the British ethnic complex.

Judging from what has gone before, it is evident that at the close of the Neolithic Period there was already well under way a localization and crystallization of ethnic factors into the three types recognized as dominant to-day, namely, *Homo nordicus, Homo alpinus,* and *Homo mediterraneus* (Fig. 410).

### Man of the Bronze and Iron Ages

With the ushering in of the Bronze Age, the practice of cremation replaced that of inhumation to such an extent as seriously to interfere with such records as can be afforded only by skeletal remains. Nevertheless, there is evidence sufficient to associate the arrival of the Bronze Age culture in western Europe with a brachycephalic race of the Alpine type. The brachycephalic wave reached Britain and left its traces in the round barrows, but it did not succeed in leaving an impress in southern Europe, where *Homo mediterranicus* continued to hold sway.

According to Hamy, the maximum extension of the tall, blond, long-headed race in western Europe was coincident with the introduction of iron, or the Hallstatt Epoch. Which land, which

ethnic type should receive the credit for this new culture? No definite answer can be given at present. It is equally difficult to say with certainty whence came the three great ethnic types of present-day Europe.

The Mediterranean race is largely a product of the south, where brown dolichocephals have been dominant since the beginning of historic time. Giuffrida-Ruggeri believed *Homo mediterraneus* to have been due to the crossing of an African type with the European Cro-Magnons. It is still dominant on all shores of the Mediterranean.

Driven westward in between the blond dolichocephals of the north and the brown dolichocephals of the south, we find a blunt wedge of brown brachycephals. The original home of this stock was probably central Asia. The invasion seems to have had its greatest impetus during the Bronze Age. Traces of it are still evident as far west as Brittany, but its chief seat in Europe has for a center the Alpine region; hence the name *Homo alpinus.*

The seeds of *Homo nordicus* could hardly have been planted in Scandinavia prior to the retreat of the last continental ice sheet. Boule suggests that they might have taken root on the plains of Russia. Giuffrida-Ruggeri believes that the Nordic race is an offshoot of *Homo mediterraneus,* altered by adaptation to its new environment. Still others would link the Nordic race with the late Paleolithic race of Cro-Magnon.

# APPENDICES

# APPENDIX I

## STRATIGRAPHIC STUDY OF PALEOLITHIC SITES

Even though there are still differences of opinion concerning the correlation of glacial with cultural chronology, there can no longer be any doubt respecting the main features of cultural evolution and their proper sequence. These results have been achieved through a strict adherence to the stratigraphic method in the study of both valley and cave deposits. In Chapters III to VI the distinguishing characters and geographic distribution of the various culture horizons were reviewed. It has seemed advisable to give in a condensed form the main facts brought to light by a detailed study of the principal sites which were occupied by man with, or without, interruption during a series of epochs, or during various phases of the same epoch. These sites are arranged alphabetically under the various countries in which they are located. The various deposits in each section represented are numbered, beginning at the bottom with the oldest.

In many caves and rock shelters the stratigraphy is as plain as in the valley deposits; in others it is sometimes difficult to make out the succession by means of distinct stratigraphic horizons; yet, except in rare instances of melange, there is a succession of culture levels, always in a uniform sequence. On this account it has been thought best to make use of the term *culture sequence* when referring to a section of a cave or rock-shelter deposit, reserving the term stratigraphy for sections of valley deposits.

Lack of space has rendered it necessary to limit the chapter on stratigraphy and culture sequence to stations in which the Paleolithic (and Eolithic) Period is represented. Suffice it to say that a culture sequence exists at many stations in which only later epochs are represented and is not without its important bearing on the subject of prehistoric chronology. A good example is the Camp de Chassey (Saône-et-Loire), where one finds evidence of a succession of epochs including: Neolithic Period, Bronze Age, first and second phases of the Iron Age, and the Roman Period. Other examples are afforded by such Neolithic lake villages as Auvernier, Bevaix, and Cortaillod (see Vol. II, p. 69).

## AUSTRIA

### Autendorf (Lower Austria)

Plateau station in the vicinity of Drosendorf.
Explored by Franz Kiessling, Obermaier, *et al.*

**References:** Kiessling and Obermaier, *MAGW*, xli, 1–32 (1911); Kiessling, *ibid.*, xlii, 209–218 (1912).

**Stratigraphy:**

2. Aurignacian
1. Mousterian

### Giesslingtal (Lower Austria)

Loess station near Spitz.
Explored by J. Bayer.

**Stratigraphy** (Bayer):

2. Aurignacian
1. Aurignacian

In digging for a foundation the peasant owner of the property found an Aurignacian ocher burial. The almost complete skull, colored red by ocher, was taken into the house where it caused so much distress to the superstitious wife of the peasant, that he broke it to pieces and threw them into a near-by stream.

### Gruebgraben (Lower Austria)

Loess station in the Kamp valley at Kammern, near Krems.
Explored by Bayer in 1922.

**Stratigraphy** (Bayer):

3. Upper Aurignacian
2. Sterile layer
1. Upper Aurignacian

### Gudenus (Lower Austria)

Cave below the ruins of Schloss Hartenstein, in the valley of little Krems, west of Krems.
Explored by Ferdinand Brun, 1883–1884.

**References:** Hacker, *MAGW*, xiv, 145–153 (1884); Hoernes, *DME*, 150–218 (1903); Obermaier and Breuil, *MAGW*, xxxviii, 277–294, 12 plates (1908).

**Culture Sequence** (Obermaier and Breuil):

5. Bronze Age
4. Neolithic

3. Magdalenian, needlecase of bird bone with engraved reindeer head
2. Horizon with animal bone
1. Mousterian, twelve cleavers

### Trabersdorf (Lower Austria)

Plateau station in the vicinity of Drosendorf.
Explored by Franz Kiessling, *et al.*

**References:** Kiessling and Obermaier, *MAGW*, xli, 1–32 (1911); Kiessling, *ibid.*, xlii, 209–218 (1912).

**Stratigraphy:**

2. Aurignacian
1. Mousterian

### Willendorf (Lower Austria)

Seven loess stations on the left bank of the Danube at Willendorf, near Krems; numbered from I–VII down the Danube, II being the most important. The sites are but partially explored.
Explored by Brun and L. H. Fisher; Obermaier and Bayer, in 1908.

**References:** Szombathy, *KB*, xl, Nos. 9–12 (1909).

**Stratigraphy** (of No. II):

9. Late Aurignacian, famous Venus of Willendorf found at base of this horizon (see Fig. 160).
8–2. Aurignacian
1. Early Aurignacian

### Zeiselberg (Lower Austria)

Loess station in the Kamp valley near Krems.
Explored by Bayer.

**Stratigraphy** (Bayer):

5. Upper Aurignacian
4. Sterile layer
3. Upper Aurignacian
2. Sterile layer
1. Upper Aurignacian

## BELGIUM

### Bay-Bonnet (*see* Fonds-de-Forêt)

### Blaireaux, Les (Namur)

Cave and rock shelter at Vaucelles, on the right bank of the Jonquière, an affluent of the Meuse.
Explored by Dupont.

**References:** Dupont, *BARB*, 2d ser., xxii, 38–40 (1866); de Loë, Rahir, and Houzé, "Fouilles au 'Trou des Blaireaux' à Vaucelles," *MSAB*, xxiv, 11 pp. (1905).

**Culture Sequence** (de Loë):

2. Neolithic, sepultures and industry of about same age as artificial caves of the Marne
1. Paleolithic (presumably Magdalenian), chipped flints, worked reindeer horn, bone needles or points, large quantity of young reindeer horn; bear, hyena, reindeer, stag, horse, ox, fox, badger (*blaireau*), etc.

### Carrières du Hainaut (Hainaut)

Sand and gravel pits at Soignies.
Explored by Rutot.

**References:** Rutot, *MARB*, 2d ser., iv, 78 pp. (1920).

**Stratigraphy** (Rutot):

1. Middle Mousterian, including one fine cleaver

### Chaleux, Le (*see* Furfooz)

### Chêne, Le (Namur)

Cave at Montaigle.
Explored by Dupont.

**References:** Dupont, *CIA*, 110–132 (Brussels, 1872).

**Culture Sequence:**

3. Neolithic, potsherds, clay spindle whorl, ax of staghorn
2. Azilian
1. Upper Magdalenian, reindeer fauna

### Coléoptère, Le (Luxembourg)

Cave on the Ourthe river in the commune of Bomal, 40 km. (25 mi.) from Liège.
Discovered and explored by J. Hamal-Nandrin.

**References:** J. Hamal-Nandrin, *RA*, xxxiv (1924).

**Culture Sequence:**

2. Neolithic, fine javelin point made of flint from Grand-Pressigny (Indre-et-Loire)
1. Magdalenian, harpoons of reindeer horn, needles of ivory, sculptured figurine of a coleopter (insect) in ivory

### Docteur, Le (Liège)

Cave in the valley of the Mehaigne, near Huccorgne.
Explored by Tihon and Fraipont from 1886–1888.

**References:** Fraipont and Tihon, *MARB*, xliii, 72 pp. (1889); Rutot, *BSBG*, xxiii, 227 (1909).

**Culture Sequence** (Rutot):

2. Middle Magdalenian, reindeer fauna; mammoth and woolly rhinoceros absent
1. Lower Aurignacian, fauna of mammoth and *Rhinoceros tichorhinus;* reindeer present; this would probably be classed as Upper Mousterian by Breuil

**Culture Sequence** (Fraipont and Tihon):

4. Neolithic
3. Magdalenian
2. Solutrean
1. Mousterian

The industry of the Hermitage cave in the same valley is considered by Rutot as Upper Acheulian (II). There are two levels distinguished by color, but apparently not otherwise. The fauna and industry were more abundant toward the bottom: flints to the number of 2,247: 63 cleavers; 18 points; 466 scrapers; 14 scratchers; 64 blades; 22 disks or nuclei; 1,600 chips, utilized or not. Some of the flints may be of Mousterian age. The fauna includes mammoth and woolly rhinoceros, but no reindeer.

### Engis (Liège)

Cavern on the left bank of the Meuse, between Namur and Liège.
Explored by Schmerling, Dupont.

**References:** Schmerling, *Recherches sur les ossemens fossiles découverts dans les cavernes de la province de Liège*, 4to, 30–32 (Liège, 1833); Dupont, *L'homme pendant les âges de la pierre dans les environs de Dinant-sur-Meuse*, 2d edit. (Brussels, 1872).

**Culture Sequence** (Rutot):

2. Magdalenian
1. Lower Aurignacian

Other levels may be included in the stalagmite breccia. The celebrated Engis skull, thought by Schmerling and Lyell to be of Paleolithic age, is believed by Rutot to be Neolithic; Boyd Dawkins and others would place it in the doubtful list.

### Fonds-de-Forêt, or Bay-Bonnet (Liège)

Double cavern in the valley of the Soumagne about 12 km. east of Liège.

Explored by Schmerling, 1829–30; Tihon, 1895; Hamal-Nandrin, 1905; Rutot, 1907.

**References:** Rutot, *AFAS*, 21st session, 10 pp. (1909); Rutot, *Bull. des chercheurs de la Wallonie*, iv, 7 pp. (1910).

**Culture Sequence** (Rutot):

4. Third ossiferous level
3. Upper Aurignacian or second ossiferous level, flint blades, gravers, scratchers, nuclei, bone amulet
2. Middle Aurignacian, summit of first ossiferous level
1. Mousterian or first ossiferous level; corresponds to Upper Mousterian of French archeologists

The lowest level is the most important. It yielded an abundance of Mousterian chipped flints, mixed with implements of Eolithic facies. The fauna was rich and varied: mammoth, *Rhinoceros tichorhinus*, cave bear, cave hyena, reindeer, horse, *Bos*.

### Furfooz (Namur)

Four caves in the valley of the Lesse above Dinant and Pont-à-Lesse: Chaleux, Frontal, Nutons, and Reauviau.

Explored by Dupont *et al.* in 1864.

**References:** Dupont, *CIA*, 110–132 (Brussels, 1872).

**Culture Sequence** (Dupont):

I. Chaleux [1]
   2. Upper Magdalenian, reindeer fauna
   1. Magdalenian, fauna of mammoth including *Ursus ferox;* chipped flints scarce
II. Frontal
   2. Upper Magdalenian, human sepulture; bone needles; reindeer fauna
   1. Mammoth fauna, no trace of human habitation
III. Nutons
   2. Upper Magdalenian, bone needles; reindeer fauna
   1. Mammoth fauna, no trace of human occupation
IV. Reauviau
   2. Magdalenian
   1. Mousterian

[1] Some Belgian authors have employed the term *Chaleuxian* in the sense of Upper Magdalenian.

### **Gendron** (Namur)

Cave in the valley of the Lesse, near the village of Gendron above Furfooz.

Explored by Dupont.

**References:** Dupont, *CIA*, 110–132 (Brussels, 1872).

**Culture Sequence** (Dupont):

2. Neolithic
1. Paleolithic, fauna of mammoth

### **Goyet** (Namur)

Four caverns at Mozet-les-Tombes, east of Namur.

Explored by Dupont.

**References:** Dupont, *CIA*, 110–132 (Brussels, 1872); Hamy, *BSA*, 2d ser., viii, 425–435 (1873).

**Culture Sequence of Third Cavern:**

4. Middle Magdalenian, necklace of fossil shells, perforated teeth of horse; harpoon of reindeer horn; baton; engraved bone; bone needles
3. Upper Aurignacian, engraved baton; perforated teeth; human bones, including two incomplete lower jaws
2. Middle Aurignacian, fauna of mammoth
1. Mousterian, bone compressors; fauna of mammoth

This cavern is characterized by the presence of harpoons, bone needles, and batons. On one of the latter the figures of a trout and a plantlike form are engraved. In Belgium, the term *Goyetian* (from Goyet) is sometimes employed as the equivalent of Lower Magdalenian.

### **Hastière** (Namur)

Cavern on the Meuse at Hastière, some 8 km. above Dinant.

Explored by Dupont.

**References:** Dupont, *CIA*, 110–132 (Brussels, 1872).

**Culture Sequence** (Rutot):

3. Aurignacian, mammoth fauna but less cold than in No. 2
2. Aurignacian, mammoth fauna with addition of tundra forms (*Myodes torquatus*); slight evolution of bone industry
1. Mousterian, utilized bone; mammoth fauna

According to Dupont, there are five ossiferous levels, three of which show traces of man's occupation. All are characterized by the fauna of the mammoth.

### Helin (Hainaut)

Sand pit in the fourth terrace of the Trouille valley, near Spiennes. Explored by Rutot.

**References:** Rutot, *CPF*, 2d ses. 223–228 (Vannes, 1906); Rutot; *La Préhistoire*, Pt. 1, 46–51 (Brussels, 1918).

**Stratigraphy** (Rutot):

3. Mousterian, cleavers
2. Acheulian
1. Lower Acheulian (Mesvinian)

Helin is an important station which requires further intensive exploration.

### Leval-Trahegnies (Hainaut)

Sand and gravel pits in the valley of the Haine.
Explored by Rutot.

**Stratigraphy** (Rutot):

2. Middle Aurignacian
1. Mousterian

### Magrite (Namur)

Cave near Pont-à-Lesse (also mentioned as being near Walzin or Anseremme).
Explored by Dupont, Rutot, *et al.*

**References:** Dupont, *CIA*, 110–132 (Brussels, 1872); Dupont, *L'homme pendant l'âge de la pierre dans les environs de Dinant-sur-Meuse*, 2d edit., 87–93 (H. Merzbach, 1872).

**Culture Sequence** (Rutot):

4. Solutrean
3. Upper Aurignacian, ivory human figurine; engraving on reindeer horn; fragment of ivory ring; Font-Robert points
2. Middle Aurignacian
1. Mousterian, bone compressors

Magrite is one of the most important stations in Belgium. The term *Magritean* is sometimes employed in Belgium as synonymous with Solutrean.

### Mesvin (Hainaut)

Section in the railway cut immediately to the west of the Spiennes section (which see).
Explored by Neyrinckx, Emile Delvaux, Rutot, *et al.*

**References:** Delvaux, *BSAB*, iv, 176 (1886); Rutot, *ibid.*, 133.

**Stratigraphy** (Rutot):

7. Recent loess (Flandrian loess)
6. Recent loess (Hesbayan loess)
5. Mousterian, cleavers; thin gravel bed at base of recent loess; fauna of mammoth and reindeer
4. Chellean, fluvial sands
3. Pre-Chellean, pebbly horizon at base of the Quaternary
2. Lower Eocene (Landenian), marine green sand
1. Chalk with flint seams; this is the site of the well-known Neolithic exploitation of flint by the sinking of pits

### Montaigle (*see* Le Sureau)

### Naulette, La (Namur)

Cave near Pont-à-Lesse.
Explored by Dupont *et al.*

**References:** Dupont, *BARB*, 2d ser., xxii, 44–54 (1866); Pruner-Bey, *BSA*, 2d ser., i, 584–603 (1866); Dupont, *CIA*, 110–132 (Brussels, 1872); Hamy, *Précis de Paléontologie humaine*, 231–234 (1870); Topinard, *R. d'A*, 3d ser., i, 384–431 (1886).

**Culture Sequence** (Dupont):

4. Magdalenian, reindeer fauna
3. Ossiferous level; fauna of mammoth
2. Mousterian, human lower jaw; fauna of mammoth
1. Ossiferous level; fauna of mammoth

### Remouchamps (Liège)

Cave in the valley of the Amblève, near Spa; known since 1832.
Explored by Schols, Delhasse, Van den Broeck.

**References:** Delhasse, *La grotte de Remouchamps* (Labroue et Co., Brussels, 1852); Van den Broeck, *BSAB*, xvii, 128–144 (1898–99).

**Culture Sequence:**

5. Soil and clay
4. Paleolithic hearths, charcoal; bones, 2 human incisors; flints (Magdalenian with tendency toward Azilian-Tardenoisian)
3. Yellow clay, bones and a single flint
2. Paleolithic hearths, bones; flints (Magdalenian ?)
1. Yellow clay

A necklace of perforated shells is said to have been found in this cave

### Sainte-Walburge (Liège)

Sand pit at Rue Jean de Wilde, Liège.

Explored by Commont (the discoverer), Marcel de Puydt, Hamal-Nandrin, Jean Servais.

**References:** Marcel de Puydt, Hamal-Nandrin, and Jean Servais, *Bull. Inst. Archéol. Liégeois*, xlii, 139–215 (1913).

**Stratigraphy** (adapted from de Puydt, Hamal-Nandrin, and Servais):

8. Humus and remanie
7. Brick earth
6. Recent loess
5. Mousterian in a thin, flinty layer
4. Mousterian in a zone of brown loess
3. Upper Acheulian, red loess (probably upper portion of middle-ancient loess)
2. Pebbly layer
1. Red loess (probably middle-ancient loess)

### Sandron (Liège)

Rock shelter in the valley of the Mehaigne near Huccorgne, opposite the Grotte du Docteur.

Explored by Count Georges de Looz, Baron de Loë, Tihon, Depauw, Fraipont.

**References:** Fraipont and Tihon, *MARB*, liv, 51 pp. (1896); Fraipont, *BSAB*, xvi, 311–332 (1898).

**Culture Sequence** (Fraipont):

3. Neolithic, vegetal earth
2. Mousterian, yellow to gray earth which contains human bones, flints, and pottery belonging to a Neolithic sepulture
1. Mousterian, cleavers; red clay with human bones, flints, and pottery belonging to a Neolithic sepulture; fauna: *Elephas primigenius*, *Rhinoceros tichorhinus*, *Equus caballus*, *Bos primigenius*, cave bear, cave hyena

### Spiennes (Hainaut)

Section in the railway cut west of the village of Spiennes, valley of the Trouille.

Explored by Briart, Cornet, Houzeau de la Haye, Rutot, *et al.*

**References:** Briart, Cornet, and Houzeau de la Haye, *Rapports sur les découvertes géologiques et archéologiques faites à Spiennes en* 1867, 2d edit. (Mons, 1872); Cornet and Briart, *CIA*, 6th session, 250–269 (Brussels, 1872); Rutot, *Antiquaries Jour.*, i, No. 1, 54–55 (1921).

**Stratigraphy** (Rutot):

7. Recent loess (Flandrian loess)
6. Recent loess (Hesbayan loess)
5. Mousterian, with cleavers, thin gravel bed at base of recent loess; fauna of mammoth and reindeer
4. Chellean, fluvial sands
3. Pre-Chellean, pebbly horizon at base of the Quaternary
2. Lower Eocene (Landenian)
1. Chalk with flint seams; the site of the well-known Neolithic exploitation of flint by the sinking of pits

## Spy (Namur)

Cave and terrace known as Betche-aux-Rotches, on the left bank of the Orneau, near the railway station of Onoz-Spy.

Explored by Rucquoy in 1879; Marcel de Puydt, Max. Lohest, and Fraipont in 1886; Musées royaux du Cinquantenaire (de Loë, Rutot, *et al.*) in 1906 and 1909.

**References:** Fraipont and Maximin Lohest, *ABB*, vii, 587 757, 3 pls. (1887); Breuil, *RA*, xxii, 126–129 (1912); Hrdlicka, *Smithsonian Publ.* No. 2300, 32–38 (Washington, 1916).

**Culture Sequence** of both cave and terrace:

5. Post-Paleolithic
4. Upper Aurignacian, with transition toward Solutrean
3. Middle Aurignacian, difficult to separate from No. 2
2. Upper Mousterian, two human skeletons; piece of utilized bone evidently of same age as upper horizon at La Quina with its many utilized bones
1. Mousterian, cleavers

The artifacts from Spy are to be found principally in the Curtius Museum at Liège (de Puydt collection), the Musée Cinquantenaire, and the Natural History Museum, Brussels. The human skeletons are in the private collection of Max. Lohest, Liège (see Fig. 223).

## Sureau, Le (Namur)

Cave at Montaigle,[2] valley of the Molignée.

Explored by Dupont, Rutot.

**References:** Rutot, *BARB*, No. 5, 335–379 (1910).

[2] The term *Montaiglean* is sometimes employed by Belgian authors in the sense of Aurignacian.

**Culture Sequence** (Rutot):

3. Azilian
2. Middle Aurignacian
1. Mousterian

## BULGARIA

### Malkata Peschtera (Trnovo)

Small cave near Samovodeni.
Explored by Popow in 1898, 1905, and 1909.

**References:** Oswald Menghin, *WPZ*, ii, 128–132 (1915).

**Culture Sequence** (Menghin):

4. Recent humus, ashes, and charcoal
3. Roman, dark clay
2. Neolithic, pebbly clay
1. Paleolithic, reddish clay with pebbles; two flint implements; cave bear, horse, cave hyena, *Bos primigenius*

### Morovitsa (Teteven)

Cave near Glożene.
Explored by Koitschew in 1909; Popow in 1912.

**References:** Oswald Menghin, *WPZ*, ii, 128–132 (1915).

**Culture Sequence** (Menghin):

2. Prehistoric, potsherds; ashes, charcoal
1. Aurignacian, sandy clay; flint implement, bone point; cave bear, cave hyena

## CHANNEL ISLANDS

### Cotte de Saint-Brelade, La (Jersey)

Cave on the south shore of the Island, near St. Helier.
Explored by E. T. Nicolle, J. Sinel, R. R. Marett.

**References:** Nicolle and Sinel, *Man*, x, 185–188 (1910); Nicolle and Sinel, *ibid.*, xii, 158–162 (1912); Marett, *Arch.*, lxii, 449–480 (1911), *ibid.*, lxiii, 1–7 (1912); *ibid.*, lxvii, 75–118 (1916); Marett and de Gruchy, *Man*, Nov., 1912; Keith, *JAP*, xlvi, 12–27 (1911).

**Culture Sequence** (Marett):

5. Aurignacian (or final Mousterian), graceful elongated implements; *Elephas primigenins, Rhinoceros tichorhinus*

4. Upper Mousterian, hearth refuse (burnt bone)
3. Mousterian
2. Lower Mousterian (?), one cleaver; *Elephas trogontherii* (?)
1. Yellow clay

## CZECHOSLOVAKIA

### Býčískála (Moravia)

Cave in the district of Kiritein.
Explored by H. Wankel in 1868.

**References:** Wankel, *MAGW*, vii, 1–6, 125–154 (1878); Obermaier, *Anthr.*, xvi, 406 (1908).

**Culture Sequence:**

2. Magdalenian
1. Aurignacian

### Čertova-díra (Moravia)

Cave in district of Stramberg, near Šipka cave.
Explored by M. Kříž.

**References:** Maška, *MAGW*, xii, 32–34 (1882).

**Culture Sequence:**

3. Magdalenian
2. Micro-fauna
1. Mousterian

### Kulna (Moravia)

Cave in the district of Sloup.
Explored by H. Wankel, M. Kříž, K. Maška, J. Knies.

**References:** Kříž, *Anthr.*, viii, 513–537 (1897); *ibid.*, *MAGW*, xxviii, 1–34 (1898); *ibid.*, ix, 341–343 (1898); Obermaier, *MV*, 307.

**Culture Sequence:**

3. Post-Paleolithic, remains of domestic animals
2. Magdalenian, bone needles
1. Mousterian, fauna typical of mild or temperate climate

### Lautsch or Fürstjohanneshöhle (Moravia)

Cave at Lautsch.
Explored by Count Szombathy.

**References:** Szombathy, *CIA*, 12th session, 133–140 (Paris, 1900).

**Culture Sequence:**

2. Magdalenian
1. Upper Aurignacian, parts of three human skeletons, including a skull in fairly good condition; bone point (mammoth's rib) with cleft base, necklace of perforated teeth of horse and wolf

### **Ondratitz** (Moravia)

Station in the open about halfway between Brünn and Olmütz.
Explored by K. Maška and Obermaier.

**References:** Maška and Obermaier, *Anthr.*, xxii, 403–412 (1911).

**Culture Sequence** (Maška and Obermaier):

2. Neolithic
1. Solutrean

There is a complete absence of faunal remains. Quartzite, hornstone, jasper, and flint were employed in the manufacture of implements.

### **Pallfy** (Little Carpathian Mts.)

Cave at Detrekö on the right bank of the Danube not far from Budapest (before the Great War, a part of Hungary).
Explored by E. Hillebrand.

**References:** Hillebrand, *WPZ*, vi, 14–39 (1919); Breuil, *Anthr.*, xxxiii, 323–346 (1923).

**Culture Sequence** (Breuil):

3. Magdalenian
2. Lower Solutrean, laurel-leaf points
1. Aurignacian, points with cleft base

### **Předmost** (Moravia)

Loess station near Prerau Junction.
Explored by H. Wankel, K. Maška, and M. Kříž since 1880.

**References:** Maška, *Der diluviale Mensch in Mähren* (Neutitschein, 1886); Kříž, *Beiträge zur Kenntnis des Quartärs in Mähren* (Steinitz, 1903); Maška, *Anthr.*, xii, 147–149 (1901); Obermaier, *ibid.*, xvi, 393 (1905); Maška, Obermaier, and Breuil, *ibid.*, xxiii, 273–285 (1912); Absolon, in Klaatsch-Heilborn's, *Der Werdegang der Menschheit und die Entstehung der Kultur*, 357–373 (Berlin, 1918).

**Stratigraphy:**

3. Aurignacian
2. Aurignacian
1. Aurignacian

The collections are for the most part in the Zemské Museum at Brünn; some are also in Vienna and Olmütz. They include: implements of flint, jasper, metamorphic sandstone, ivory assegai, and daggers made from lion and bear fibulae; six human female figures carved from metacarpals of the mammoth, large ladles of ivory, ribs of mammoth with incised herringbone pattern, large rib with incised wave ornament, ivory beads, sections of ivory 7.5 to 12.5 cm. (3 to 5 in.) long; perforated teeth, perforated leg bones of a young mammoth, perforated dorsal spine of an adult mammoth; parts of about 1,000 skeletons of mammoths of all ages up to 400 years, cave bear, cave wolf, arctic fox, polar fox (*Canis lagopus*) *Cervus tarandus, Gulo borealis.*

### **Šipka** (Moravia)

Cave in the district of Stramberg.
Explored by K. Maška, 1879–1883.

**References:** Maška, *MAGW*, 67 (1882); Maška, *Der diluviale Mensch in Mähren* (1886); Obermaier, *MV*, 160–161, 309, 351; Hrdlicka, *Smithsonian Publ.* No. 2,300, 61 (Washington, 1916).

**Culture Sequence:**

6. Recent deposits
5. Magdalenian, yellowish brown deposit
4. Mousterian
3. Sterile deposit
2. Mousterian, lower jaw of child; implements and chips of quartzite
1. Gray and greenish sands

### **Vypustek** (Moravia)

Cave in the district of Kiritein.
Explored by M. Kříž.

**References:** Obermaier, *MV*, 306–307.

**Culture Sequence:**

2. Neolithic
1. Paleolithic

## ENGLAND

### **Aveline's Hole** (Somerset)

Cave at Burrington Combe.
Explored by Dean Buckland, Rev. D. Williams, Boyd Dawkins.

**References:** Davies, *Proc. Spelaeol. Soc. Bristol.* i. 61–82 (1920–21).

**Culture Sequence:**

2. Azilian (?), in stalagmite, perforated shells; bone and flint implements
1. Late Paleolithic—late Magdalenian type of harpoons made of staghorn; flint implements of Upper Paleolithic types

### Bacon Hole (South Wales)

Cave on the Gower Peninsula.
Explored by Colonel Wood.

**References:** Falconer, *PM*, ii, 498–540 **(1868).**

**Culture Sequence:**

8. Post-Paleolithic, pottery; dark alluvial earth containing bones of *Bos*, *Cervus*, *Canis vulpes*, red deer, roebuck
7. Paleolithic, stalagmite with bones of *Ursus*
6. Breccia, bones of *Ursus* and *Bos*
5. Stalagmite, elephant tusk embedded at base
4. Ocherous cave earth, *Rhinoceros hemitaechus*, *Elephas antiquus*, hyena, wolf, *Cervus*, *Bos*, *Ursus*
3. Blackish sand, *Elephas antiquus* (abundant), badger
2. Stalagmite, thin layer formed after floor of cavern had been elevated above high water
1. Yellow sand, *Littorina littorea*, *Arvicola*, bird bones

### Brixham (Devon)

Cave near Torquay.
Explored by W. Pengelly *et al.*, 1858–59.

**References:** Falconer, Ramsay, and Pengelly, *PM*, ii, 486–497 (1868); Pengelly, Busk, Prestwich, *PRS*, xx, 514–524 (1872).

**Culture Sequence:**

4. Stalagmite deposit
3. Paleolithic, flint knives; ocherous cave earth with limestone breccia
2. Paleolithic, flint knife under leg bones of cave bear (femur, tibia, and fibula with patella and astragalus in anatomic relation)
1. Paleolithic, probably Mousterian, rounded gravel

### Creswell Crags (Derbyshire)

Three caves: Robin Hood, Church Hole, and Pin Hole.
Explored by the Rev. J. Magens Mello.

**References:** Mello, *QJGS*, xxxi, 679-691 (1875); Mello and Dawkins, *ibid.*, xxxii, 240–258 (1876); *ibid.*, xxxiii, 570–612 (1877); Boyd Dawkins, *Early Man in Britain* (London, 1880).

**Culture Sequence of Robin Hood** (Dawkins):

6. Roman and mediaeval
5–4. Aurignacian or Solutrean, implements; bones; engraving on bone; stalagmitic breccia and upper cave earth
3. Mousterian or Acheulian, implements of flint, iron-stone, and quartzite, including cleavers; fossils; cave earth
2. Red clayey sand, rude implements of quartzite; animal remains
1. Sterile deposit of light-colored sand with limestone blocks

## Cromer (Norfolk)

Station in the Cromer Forest Bed, near Runton.

Explored by Clement Reid; W. J. Lewis Abbott; W. L. H. Duckworth; J. Reid Moir.

**References:** Lewis Abbott, *Nat. Sci.*, x, 89–96 (1897); Duckworth, *Antiquar. Soc. Communic.*, xv, 156 (1911); Reid Moir, *JAI*, li, 385–418 (1921).

**Stratigraphy of Composite Section:**

I. 10. Hummocky drift
9. Gravel and sand, Paleolithic cleaver found in 1878
8. Contorted drift (glacial)
7. Lower glacial till
6. Arctic fresh-water bed
5. *Leda myalis* bed
4. Upper fresh-water bed
3. Estuarine beds, sands and gravel; Elephant Bed, level at which Abbott found worked flints
2. Lower fresh-water beds
1. Shelley Weybourn Crag and stone bed (Günz or Scanian glacial)

The Forest-Bed series is composed of Nos. 4, 3, and 2. Reid Moir believes he has found a workshop on the foreshore of the gravels at the base of No. 3.

II. (Adapted from Reid Moir):

6. Humus
5. Contorted drift (glacial)
4. Pre-Chellean, Cromer Forest-Bed series; Günz-Mindel (or Norfolkian); worked flints from base on the foreshore; *Elephas meridionalis, E. antiquus, Rhinoceros etruscus, Equis stenonis, Ursus spelaeus, Cervus elaphus*
3. Shelley Weybourn Crag (Günz or Scanian)

2. Stone bed at base of Weybourn Crag
1. Chalk

### Eaton (Norfolk)

Lime pit near Norwich.
Explored in 1905 by W. G. Clarke.

**References:** Clarke, *Trans. Norfolk and Norwich Naturalists' Soc.*, viii, 216 (1905); Clarke, *Proc. Prehist. Soc. of East Anglia*, i, 160–168 (1912).

**Stratigraphy** (Clarke):

4. Gravels and sands
3. Eolithic or Paleolithic, chipped flints from a stratum 4.88 m. (16 ft.) below the surface
2. Eolithic, chipped flints from a thin, flinty bed 9.15 m. (30 ft.) below the surface at base of Norwich Crag; mammalian remains
1. Chalk

F. N. Howard thinks the chipped flints found at Eaton might be the work of nature (*Proc. Prehist. Soc. of East Anglia*, i, 185–193, 1912). At Whitlingham (Norfolk), flint artifacts were found in a stone bed corresponding to No. 2 above, by H. B. Woodward in 1878; Clarke later found additional examples at the same site.

### High Lodge (Suffolk)

Station in the valley deposits near Mildenhall.
Explored by J. Reid Moir; M. C. Burkitt.

**References:** Marr, Reid Moir, Smith, *Proc. Prehist. Soc. East Anglia*, iii, 353–379 (1921).

**Stratigraphy** (Moir):

7. Upper boulder clay
6. Mousterian, gravel; cleavers
5. Mousterian, brick earth
4. Acheulian, sandy gravel
3. Lower boulder clay
2. Coarse gravel, rolled implements
1. Chellean, implements

### Hoxne (Suffolk)

Sand and clay pit, a half mile south of Hoxne village.
Explored by John Frere from 1797; Sir John Evans and Sir Joseph Prestwich in 1859; British Assoc. Committee in 1895–96.

**References:** John Frere, *Arch.*, xiii, 204 (1800); Prestwich, *PT*, *cl*, 304–308 (1860); *British Assoc. Report*, 400–415 (1896).

**Stratigraphy** (British Assoc. Com.)

7. Acheulian (probably), implements; bones; shells; sand loess
6. Acheulian (probably), many flint cleavers found by Frere; gravel
5. Black loam, arctic flora
4. Lignite bed, temperate flora
3. Clay, temperate flora
2. Chalky boulder clay (glacial formation)
1. Glacial sands

**Ipswich** (Suffolk)

Five stations in the vicinity of Ipswich.
Explored by J. Reid Moir.

**References:** Reid Moir, *Proc. Preh. Soc. East Anglia*, i, 17–43 (1911); *ibid.*, *JAI*, xlvii, 367–412 (1917); *ibid.*, *Proc. Preh. Soc. East Anglia*, iii, 389–430 (1921).

**Stratigraphy** (J. Reid Moir):

I. Bolton and Laughlin brickfield (composite section)

17. Roman burial ground
16. Neolithic
15. Early Solutrean
14. Aurignacian, sandy clay; Floor D: carinate scratchers, gravers
13. Sterile sands
12. Peat
11. Upper Mousterian (at top of brick earth), Floor C: shafts of adult human femur and humerus, fragment of adult human cranium
10. Sands
9. Flinty clay } Equivalent of yellow boulder clay
8. Clay, Floor B1: scraper of quartzite
7. Bluish sandy loam roughly stratified
6. Lower Mousterian, Floor B: flint scrapers, quartzite hammerstones
5. Lower boulder clay (blue)
4. Floor A, burnt flints and flint flakes
3. Pre-Chellean, midglacial (interglacial) sands and gravels, burnt and worked flints
2. Eolithic, Red Crag with detritus bed at base; worked flints from detritus bed (Pliocene)
1. London clay (Eocene)

II. Bramford brickfield (Coe's Pit No. 1)

7. Wash
6. Midglacial sands

5. Eolithic, Red Crag with detritus bed at base; chipped and burnt flints from detritus bed, shark's teeth
4. Reading Beds
3. Thanet sands
2. London clay (Eocene)
1. Chalk (Cretaceous)

The total thickness of the section from Wash to Eocene clay inclusive is more than 15.3 m. (50 ft.).

III. Foxhall Hall coprolite pit (composite section)

10. Humus
9. Upper Mousterian and Aurignacian, loamy sands
8. Yellow boulder clay
7. Foxhall-Road levels (from Nos. 2 to 5 inclusive)
6. Lower or blue boulder clay
5. Midglacial sands, 3.7 m. (12 ft.)
4. Eolithic, Red Crag, worked flints, coprolites; "16-ft. level," definite occupation level with cores, flakes, flint implements, and burnt stones (Moir)
3. Eolithic, Red Crag, worked flints; "18-ft. level"
2. Detritus bed at base of Red Crag
1. London clay (Eocene)

Nos. 6 to 9 are not present

IV. Foxhall Road [3] brickfield

7. Humus
6. Mousterian, gravels with glacial striae; equivalent of upper, or yellow, boulder clay
5. Acheulian in a gravelly seam near base of decalcified yellow brick earth, known locally as "Pug." No fauna
4. Acheulian, blue brick earth (undecalcified); patinated flint implements
3. Acheulian, sandy gravel; unpatinated, unrolled flint implements
2. Old brick earth
1. Lower boulder clay (blue), Rissian (?)

V. Thorington Hall littoral deposits

4. Yellow boulder clay
3. Brick earth
2. Eolithic, Red Crag with detritus bed at base; flint implements from detritus bed (Pliocene)
1. London clay (Eocene)

The detritus bed is older than the rest of Red Crag. In it were found three species of deer. The deposits are rich in shells and are exploited for lime.

[3] Also called Derby Road.

Fauna of Red Crag: *Fusus contrarius, Cardium, Pectunculus* (also found at Boncelles), *Purpura lapillus, Littorina littorea, Mya arenaria, Trogontherium, Mastodon arvernensis, Elephas meridionalis, Gazella anglica, Tapirus arvernensis*

### Kent's Hole (Devon)

Cavern near Torquay.

Explored by Rev. J. MacEnery, beginning in 1824–25; R. A. C. Godwin-Austin; E. Vivian; W. Pengelly.

**References:** Pengelly, "Literature of Kent's Cavern, Torquay, prior to 1859," *Trans. Devon Assoc. Adv. Sci., Lit., and Art* (1868); *ibid.* (1869); Boyd Dawkins, *Cave Hunting* (London, 1874); Sir John Evans, *Ancient Stone Implements of Great Britain*, 2d edit. (London, 1897).

**Culture Sequence:**

7. Sterile deposit
6. Neolithic and Bronze
5. Sterile deposit
4. Magdalenian or its equivalent (dark layer)
3. Upper Mousterian and later (red cave earth)
2. Sterile deposit
1. Acheulian and Mousterian (breccia)

### Langwith (Derbyshire)

Cave on Poulter brook, 4.8 km. (4 mi.) south of Creswell Crags.

Explored by Rev. E. H. Mullens from 1903.

**References:** Mullens, *Journ. Derbyshire Arch. Nat. Hist. Soc.*, 1 (1913).

**Culture Sequence:**

3. Post-Paleolithic (probably), bone awl; recent fauna
2. Paleolithic, probably Magdalenian or Upper Aurignacian; woolly rhinoceros, cave bear
1. Paleolithic, probably Aurignacian; hearths; flint and bone implements; reindeer, woolly rhinoceros, lemming

### Paviland (Glamorganshire)

Cave in Wales between Oxchurch Bay and Worms, some 24 km. (15 miles) from Swansea.

Explored by L. W. Dillwyn and Miss Talbot; Dean Wm. Buckland; W. J. Sollas and H. Breuil.

**References:** Buckland, *RD*, 82–98 (1823); Boyd Dawkins, *Cave Hunting* (London, 1874); Sollas, *JAI*, xliii, 325–374 (1913); Sollas, *Ancient Hunters*, 2d edit. (Macmillan, 1915).

**Culture Sequence** (Sollas):

2. Upper Aurignacian
1. Middle Aurignacian

Sollas failed to find successive stratified deposits, but did find implements of various types ranging from Mousterian to Upper Aurignacian. The most important single object was the so-called "Red Lady of Paviland," discovered by Buckland, which Sollas finds to be a male instead of a female. The skull and greater part of the right side were missing. What was left of the remains are preserved in the University Museum, Oxford. At the hip lay two handfuls of periwinkle shells (*Natica neritalis*), and ivory implements were found next to the ribs of the skeleton. Collections from the cave may be seen in the museum at Swansea and also at Oxford.

## **Piltdown** (Sussex)

Gravel pit in Piltdown Common near Fletching.
Explored by Charles Dawson, A. Smith Woodward, Father Teilhard.

**References:** Dawson and Smith-Woodward, *QJGS*, lxix, 117–151 (1913); *ibid.*, lxx, 82–99 (1914); G. S. Miller, *Smithsonian Misc. Colls.*, lxv, No. 12 (1915).

**Stratigraphy:**

4. Humus (see Figs. 31 and 209)
3. Neolithic, sandy loam with gravel; flints and sherds
2. Pre-Chellean, gravel deposit; worked flints; bone implement 40 cm. (16 in.) long made from leg bone of *Elephas antiquus;* (see Fig. 32) fossil animal remains, human skull (see Figs. 207–211)
1. Lower Cretaceous (Wealden)

## **Swanscombe** (Kent)

Several gravel-pit stations: Barnfield pit, Milton Street; Colyer's pit, Milton Street; Globe pit, Greenhithe.
Explored by Henry Stopes; Reginald A. Smith, Henry Dewey.

**References:** Smith and Dewey, *Arch.*, lxiv, 177–204 (1912–13).

**Stratigraphy** (Barnfield pit in the 30 m. (100 ft.) terrace):

4. Mousterian
3. Acheulian
2. Chellean
1. Pre-Chellean

### Traveler's Rest (Cambridge)

Sand and gravel pit near Cambridge.
Explored by J. E. Marr and M. C. Burkitt.

**References:** Marr, *QJGS*, lxxv, 204–229 (1919); Kennard and Woodward, *ibid.*, 229–241 (1919); Burkitt, *ibid.*, 241–242 (1919).

**Stratigraphy** (Marr and Burkitt):

5. Boulder clay
4. Mousterian, with gray-blue patina; contorted sands
3. Chellean-Acheulian, horizontal sands; warm fauna
2. Striated pebbles
1. Galt

### Victoria Cave (Yorkshire)

Cave near Settle.
Explored by Joseph Jackson, *et al.*

**References:** Roach Smith and Joseph Jackson, *Collectanea antiqua*, i, No. 5 (1844); Boyd Dawkins, *Cave Hunting*, 81–101 (London, 1874); Tiddeman, *Proc. Geol. and Polytech. Soc. of West Riding of Yorkshire* (1875).

**Culture Sequence:**

5. Romano-Celtic
4. Neolithic
3. Paleolithic, upper cave earth; reindeer
2. Paleolithic, laminated clay
1. Paleolithic, lower cave earth; hyena, hippopotamus, man

### Wookey Hole (Somerset)

Several caves on the south side of the Mendip Hills, near Wells; the largest is known as Hyena Den.

Explored by W. Boyd Dawkins and Rev. J. Williamson in 1859; by Dawkins, Willett, Parker, and A. Sanford; later by E. Balch.

**References:** Boyd Dawkins, *Cave Hunting*, 295–314 (London, 1874); H. E. Balch, *Wookey Hole, its Caves and Cave Dwellers*, xiv+268 (Oxford University Press, 1914).

**Culture Sequence** (from works of both Dawkins and Balch):

4. Post-Roman
3. Romano-British, two horizons
2. Celtic, several horizons
1. Paleolithic

## FRANCE

### Abbeville (Somme)

Several sand and gravel pits at and near Abbeville in the second and third terraces of the Somme valley and that of the Scardon, a tributary. The fourth, or youngest terrace at Abbeville, is below the level of the Somme. The buried channel of the Somme and its peat bogs testify to the land depression accompanying the formation of the present English Channel.

Explored by Boucher de Perthes, Prestwich, Lyell, d'Ault du Mesnil, Commont, *et al.*

**References:** Boucher de Perthes, *Antiquités celtiques et antediluviennes*, 2 vols. (Paris, 1849 and 1857); Prestwich, *PT*, cl, 277–317 (1860); John Evans, *Arch.*, xxxviii, 280–307 (1860); d'Ault du Mesnil, *REA*, vi, 284–296 (1896); Commont, *Ann. Soc. Géol. du Nord*, xxxix, 249–291 (1910).

I. The Carpentier pit is a continuation of the old Moulin-Quignon pit; both are in the second terrace. Between the two, acres upon acres of sands and gravels have been removed. The Carpentier pit was rich in fossil fauna.

**Stratigraphy:**

9. Neolithic, sandy vegetal earth
8. Pebbly layer, white, fractured flints
7. Upper Acheulian, brick earth of the ancient loess
6. Lower Acheulian, flinty layer
5. Chellean, cross-stratified yellow and white sands
4. Gravelly layer
3. Ossiferous marl
2. Greenish sandy clay (*glaise*), fluviatile shells
1. Coarse gravels with large flint nodules [4]

II. Champ de Mars, gravel pits above the Champ de Manœuvres.

**Stratigraphy** (adapted from d'Ault du Mesnil):

10. Merovingian
9. Gallo-Roman
8. Neolithic
7. Recent loess
6. Acheulian, red loess, mammoth, industry at the base
5. Red, sandy clay, mammoth, Paleolithic industry at base
4. Yellowish sands and clays, mammoth and industry at base
3. Chellean worn gravels and sands (fluviatile), mammoth, *Elephas antiquus*

[4] From these flint nodules Father Godard and his pupils are said to have fabricated spurious paleoliths for more than forty years.

2. Pre-Chellean, gray sand marl with horizontal stratification, mammoth, *Elephas antiquus*, *E. meridionalis*, *Rhinoceros merckii*, and industry at base
1. Coarse, slightly worn gravels horizontally stratified, *Elephas antiquus*, *E. meridionalis*, *Rhinoceros merckii*

The association of the three species of elephant occurs only in the two lowest levels. This same association of all three species occurs at Tilloux (Charente). The association of at least two of these species of elephant is found at Chagny in France, Saint-Acheul (Somme), in the basin of the Rhône, in the Cromer Forest Bed (Norfolk), in the valley of the Ouse, and at Rixdorf near Berlin.

III. Moulin-Quignon, sand and gravel pit in the second terrace, where in 1863 a workman is reputed to have found *in situ* a human lower jaw. Later it was proved to the satisfaction of a competent committee that the lower jaw had been planted in the gravel bed and was not of Paleolithic age.

**Stratigraphy** (Prestwich):

3. Surface soil—0.3 m.
2. Brown sandy clay, gravel, and sharp flint fragments—0.6 m.
1. Paleolithic, yellow, ocherous, and ferruginous gravel of sub-angular flint fragments, also flints but little broken; the whole in a matrix of clay and siliceous sand containing flint implements, bones of ruminants, and teeth of *Elephas primigenius*—3.6 m.

IV. Menchecourt. From the pits of this suburb, no longer worked, rude flint implements were reported as early as 1841. The pits were at an altitude of some 12 m. (39.4 ft.) in the third terrace. Prestwich states that the ground in the Dufour pit was only 7.3 m. (24 ft.) above the highest tides of the Somme at Abbeville.

**Stratigraphy** (Prestwich):

7. Surface soil—0.2 m.
6. Brown clay with sand including weathered flint fragments—1.6 m.
5. Mousterian, buff-colored fine loam with small concretions (*poupées*), evidently recent loess; land shells, bones, flint implements—4.6 m.
4. Fine whitish sand with chalk débris, also subordinate beds of loess; flint implements (probably Acheulian), fresh-water shells, marine shells, bones chiefly on the gravel at the base—2.1 m.
3. White and ocherous sub-angular flint gravel; shells and bones as above, "also worked flints" (?)—0.2 m.
2. Light colored, fine sandy marl; shells, chiefly land species —1.4 m.
1. Ocherous sub-angular gravel, digging here stopped by water

V. Dufour pit, Menchecourt.

**Stratigraphy** (Boucher de Perthes):

5. Surface soil, clay, flint fragments, etc.—3.0 m.
4. Yellow clay sands mixed with gravels and chalk—1.5 m.
3. Gray clay sands, "flint cleaver" (?)—1.0 m.
2. Sharp yellow sands mixed with gray clay, shell fragments, etc. —2.0 m.
1. Sharp white sands employed in the building trades. Here for the most part are found the fossil bones and flint implements (probably Chellean). At the base of this deposit, water is encountered—3.0 m.

VI. Mautort pit in the third terrace, 4 km. (2.5 mi.) from Abbeville on the left bank of the Somme.

**Stratigraphy:**

11. Neolithic, surface wash
10. Brick earth
9. Pale-yellow deposit of loess
8. Mousterian, pebbly deposit, small white fractured flints
7. Ancient loess
6. Flinty deposit reddish in color
5. Ancient loess (yellow, stratified)
4. Lower Acheulian, flinty deposit and coarse sands
3. Upper Chellean, greenish sands
2. Stratified alluvial sands with seams of gravel
1. Chellean, fluviatile gravels 4 to 5 m. thick, rolled flints

VII. Leroy pit, Faubourg Saint-Gilles, altitude 28 m. (92 ft.), 2d terrace.

**Stratigraphy:**

6. Brown sandy vegetal earth
5. Mousterian, pebbly layer of white fractured flints
4. Acheulian, red clay sands (ancient brick earth)
3. Gravels
2. Yellowish fluviatile sands interstratified with small gravel beds
1. Lower gravel beds

VIII. Gamain pit at l'Ermitage, valley of the Scardon, left bank, altitude 13 m., 3d terrace.

**Stratigraphy:**

6. Vegetal earth with flints
5. Red sandy clay
4. Lower Acheulian, flinty layer
3. Chellean, white, gray, or yellow cross-stratified sands
2. Gravels and coarse red sands
1. Chalk

IX. L'Heure pit in the direction of Caours, valley of the Scardon, altitude 20 m. (65.7 ft.).

**Stratigraphy:**

7. Brown vegetal earth
6. Layer of fractured flints with white patina
5. Red sandy clay (ancient brick earth)
4. Lower Acheulian, flinty deposit
3. Chellean, yellowish stratified sands, cutting a subjacent bed composed of altered chalks and flints
2. White fluviatile sands
1. Fluviatile gravels

X. Carpentier pit. valley of the Scardon, altitude 35 m. (115 ft.), 2d terrace.

**Stratigraphy:**

7. Vegetal earth
6. Mousterian, fine flinty deposit
5. Red, sandy clay
4. Acheulian, flinty deposit with brown clay cutting the subjacent sands
3. Yellowish sands
2. Gravels
1. Chalk

## **Achenheim** (Alsace)

Loess station in the foothills of the Vosges mountains, west of Strassburg. Explored by E. Schumacher, P. Wernert, R. R. Schmidt.

**References:** Schmidt and Wernert, *PZ*, i, 339–346 (1909).

**Stratigraphy** (Schmidt and Wernert):

4. Neolithic (Robenhausian)
3. Upper Aurignacian, recent loess, hearths
2. Mousterian, recent loess, chief faunal horizon with hearths
1. Upper Acheulian, ancient loess, hearths

## **Amiens** (Somme)

Various sand and gravel pits at Amiens, especially in the suburbs of Montières and Saint-Acheul.

Explored by Rigollot, Prestwich, Evans, Commont, *et al.*

**References:** Rigollot, *Mém. sur des instruments en silex trouvés à Saint-Acheul près d'Amiens* (Amiens, 1855); Commont, *Anthr.*, xix, 527–572 (1908); Commont, *AFAS*, 437–444, 774–802 (Lille, 1909); Commont, *Mém. Soc. géol. du Nord*, vi, mém. iii (1909); Commont, *CPF*, 69–77,

82–90 (Beauvais, 1910); COMMONT, *Bull. Soc. Lin. du Nord de la France* (1910); COMMONT, *Ann. Soc. géol. du Nord*, xli, 12–52 (1912); COMMONT, *CIA*, i, 239–254, 291–300 (Geneva, 1912); COMMONT, *Mém. Soc. des antiq. de Picardie*, xxxvii, 430 pp. (1913).

I. Debary sand and gravel pit at an elevation of 75 m. (246 ft.) in the first or oldest terrace near Montières.

**Stratigraphy** (Commont):

5. Neolithic
4. Mousterian
3. Acheulian
2. Chellean
1. Pre-Chellean

II. Buhant and Boutmy-Muchembled pits in the 4th or lowest terrace at Montières, altitude 20–28 m. (65.7–92 ft.) (see Figs. 20 and 34).

**References:** COMMONT, *CIA*, i, 291–300 (Geneva, 1912)

**Stratigraphy** (Commont):

9. Upper Aurignacian
8. Middle Aurignacian
7. Upper Mousterian
6. Mousterian
5. Mousterian
4. Ancient Mousterian with warm fauna (*Elephas antiquus, Rhinoceros merckii, Hippopotamus*)
3. Chellean
2. Chellean
1. Chellean

III. Étouvy in the 4th or lowest terrace at Montières, altitude 20–22 m. (65.7–72.2 ft.).

**Stratigraphy:**

5. Neolithic, vegetal earth
4. Magdalenian, brick earth
3. Solutrean, brick earth
2. Aurignacian (same level as Belloy), yellow recent loess
1. Mousterian, recent gravel; reindeer fauna

IV. Rue de Cagny in the 3d terrace at Saint-Acheul, altitude 42–45 m. (138–147.7 ft.)

**Stratigraphy** (Commont):

3. Acheulian, the principal implement-bearing horizon (see Fig. 48)
2. Chellean (see Fig. 38)
1. Pre-Chellean (see Fig. 29)

V. Bultel-Tellier pits in the 3d terrace at Saint-Acheul, altitude 42–45 m. (138–147.7 ft.) (see Figs. 21 and 46).

**Stratigraphy of composite site** (Commont):

11. Gallo-Roman
10. Neolithic
9. Aurignacian
8. Upper Mousterian
7. Mousterian
6. Mousterian, arctic fauna
5. Upper Acheulian, lanceolate forms with white patina
4. Acheulian workshop
3. Acheulian workshop
2. Chellean
1. Pre-Chellean

VI. Fréville sand and gravel pit in the second terrace, Route de Boves, Saint-Acheul.

**Stratigraphy** (Commont):

7. Neolithic, disturbed surface brick earth
6. Paleolithic, flint blades, undisturbed brick earth
5. Mousterian, flinty deposit at base of recent loess
4. Upper Acheulian, flint implements with white patina, red clay or brick earth of ancient loess
3. Lower Acheulian, flint implements with reddish patina, yellowish sands with black points
2. Chellean, rare examples of flints with nodular crust at base and no patina, sharp sands
1. Lower gravels, flint chips rare

VII. Leclerq sand and gravel pit in the second terrace, Route de Boves, Saint-Acheul.

**Stratigraphy** (Commont):

4. Upper flinty deposit
3. Red, sandy clay or brick earth of ancient loess
2. Chellean, sand and gravel deposit
1. Pre-Chellean, sand and gravel deposit

## **Ammonite** (Charente)

Cave near the cave of Le Placard, commune of Vilhonneur.
Explored by A. P. Ragout.

**References:** not yet published

**Culture Sequence:**

3. Bronze Age
2. Azilian (initial stage)
1. Magdalenian (final stage), bone needles, harpoons, engraving of Cervidae on bone, fossil ammonite shell decorated with holes.

## Arcy-sur-Cure (Yonne)

Several caves: Grotte des Fées, Trou de l'Hyène, Grotte de l'Ours, Grotte du Trilobite, etc.

Explored by the Marquis de Vibraye, Cotteau, G. de Mortillet, the Abbés Parat and Breuil.

**References:** DE VIBRAYE, *BSGF*, 2d ser., xvii, 462–478 (1859–60); DE QUATREFAGES and HAMY, *Crania ethnica*, 25 and Pl. ii; PARAT, *CIA*, 63–78 (Paris, 1900).

**Culture Sequence:**

I. Grotte des Fées, length 150 m. (492.5 ft.); many fossil remains for the first 50 m. (164.2 ft.); flints to the number of 20,000.

5. Neolithic
4. Magdalenian
3. Solutrean
2. Mousterian
1. Mousterian, débris of cave bear and cave hyena, human lower jaw, cleavers

II. Grotte du Cheval.

2. Post-Mousterian
1. Mousterian

III. Grotte de l'Homme

2. Neolithic
1. Magdalenian, three crania (may be Neolithic)

IV. Trou de l'Hyène

2. Magdalenian
1. Mousterian

V. Grotte de l'Ours.

Mélange of Mousterian and later industries

VI. Grotte du Trilobite, accessible for 50 m. (164.2 ft.); over 17,000 flint chips, of which more than 1,000 are implements; bone points, javelins, polishers, needles, whistle; carved reindeer horns; perforated teeth, incised bones; engravings on bone and schist; deposits similar to those in the Grotte des Fées; total thickness of the deposits, 6 m. (19.7 ft.).

6. Neolithic
5. Magdalenian, fossil trilobite incised ventrally and with two lateral perforations
4. Solutrean
3. Aurignacian, containing *Rhinoceros tichorhinus* engraved on a schistose pebble; fragment of reindeer bone, on which is engraved a stem with seven alternate lanceolate leaves
2. Aurignacian
1. Mousterian

### **Arudy** (Basses-Pyrénées)

Caves of Espélungues and Saint-Michel.

Explored by Nadaillac, Garrigou, Ed. Pottier, Ed. Piette, *et al.* (in Espélungues), F. Mascaraux (in Saint-Michel).

**References:** Garrigou and Martin, *AS*, lviii, 757–763 (1864); Piette, *APAR*, pls. viii, xxx, lxxxv–xciii; Mascaraux, *REA*, xx, 357–378 (1910).

**Culture Sequence:**

I. Saint-Michel (small cave), fauna: horse (very abundant), reindeer (common), stag, ox, wild goat, pig, fox, wolf, brown bear, rodents, crow.

3. Magdalenian, long javelin points with single bevel at base
2. Magdalenian, horse's head with contours cut away
1. Magdalenian, sculpture in the round, spear throwers

The principal collections from Arudy (see Fig. 180, No. 3) are at Saint-Germain-en-Laye.

### **Aurensan** (Hautes-Pyrénées)

Cave near Bagnères-de-Bigorre.

Explored by E. and Ch. L. Frossard.

**References:** Frossard, *Mat.*, vi, 205–216 (1870).

**Culture Sequence:**

2. Magdalenian, harpoons
1. Upper Paleolithic (probably Magdalenian)

### **Aurignac** (Haute-Garonne)

A small cave near the village of Aurignac discovered in 1852.

Explored by Ed. Lartet in 1860.

**References:** Lartet, *Mémoire sur la station humaine d'Aurignac* (1860); Lartet, *ASNZ*, xv, 4th sér. (pls. 10, 11, 12), 177–253 (1861); Breuil, *HP*, ii (1907).

**Culture Sequence:**

3. Neolithic (see Fig. 75)
2. Aurignacian
1. Aurignacian

### **Badegoule,** or **Badegols** (Dordogne)

Rock shelter at Sous-le-Roc, commune of Bersac.

Explored by Hardy, Massenat, Girod, Pittard, Goulpie, Raymond, Peyrony.

**References:** Girod, *Les stations de l'âge du renne dans les vallées de la Vézère et de la Corrèze*, iii, 27 (Ballière et Fils, 1900); Peyrony, *RP*, iii, 97–116 (1908).

**Culture Sequence** (Peyrony):

7. Talus—1.6 m.
6. Magdalenian, brownish deposit—20 cm.
5. Magdalenian, sandy layer poor in cultural remains—20 cm.
4. Lower Magdalenian, batons, bone needles, perforated teeth, etc.; brown conglomerate—35 cm.
3. Solutrean, reddish layer—30 cm.
2. Solutrean, poor in cultural remains—40 cm.
1. Solutrean—15 cm.

Fauna: Solutrean, reindeer dominant, ox, horse; Magdalenian, reindeer dominant, ox, horse, fox, wolf, *Arvicola*, birds, human tooth.

### **Balutie, La** (Dordogne)

Rock shelters in the commune of Montignac.

Explored by Reverdit

**References:** G. and A. de Mortillet, *Préh.*, 643

**Culture Sequence:**

2. Upper Solutrean, three perfect *pointes à cran* forming a cache, hid in a small anfractuosity of the rock
1. Mousterian

### **Batie** (Lot)

Cave (*Crozo bastido*) in the commune of Pinsac on the opposite bank of the Dordogne from the cave of Lacave.

Explored by A. Viré.

**References:** Viré, *CPF*, 215 (Périgueux, 1905).

**Culture Sequence:**

4. Pottery of the Middle Ages
3. Gallic pottery
2. Neolithic
1. Magdalenian, engraving on bone with contours cut away; engraving of horse on bone; bone needles, harpoons

### Batuts, Les (*see* Bruniquel)

### Beauregard (Seine-et-Marne)

Station in the open near Nemours.
Explored by G. Fouju, Henri-Martin, *et al.*

**References:** Henri-Martin, *CPF*, 235–239 (Beauvais, 1909).

**Culture Sequence** (Henri-Martin):

6. Vegetal earth
5. Tardenoisian, gray sand
4. Magdalenian, yellow sand
3. Magdalenian, pale-yellow sand
2. Pre-Magdalenian, pale-yellow sand
1. Fontainebleau sandstone

### Bedeilhac (Ariège)

Cave in the commune of the same name near Tarascon; not yet thoroughly explored.
Explored by E. Cartailhac.

**References:** Cartailhac and Breuil, *Anthr.*, xxi, 149–150 (1910).

**Culture Sequence:**

2. Neolithic
1. Paleolithic

### Bellon (Cher)

Station in a low terrace sand and gravel deposit at the junction of the Cher and the Yèvre near Vierzon.
Explored by Maillary, Compain, Andrieu, and Bourlon.

**References:** Bourlon, *Mém. Soc. des Antiquaires du Centre*, xxxiv (1912).

**Stratigraphy:** At Bellon there is a mixture of types that defies stratigraphic treatment. The station represents morphologically every phase of Paleolithic culture, also parts of the Neolithic and of the Bronze Age. The Magdalenian phase of the Paleolithic is best represented.

### Bertonne (Gironde)

Station on the surface at Les Bichons, commune of Peujard.

**References:** François Daleau, "Silex à retouches anormales de la station de la Bertonne ou la Rousse," *Actes Soc arch. de Bordeaux*, xxxi, 18 pp (1910).

**Stratigraphy:**

4. Neolithic
3. Solutrean
2. Aurignacian
1. Mousterian

Daleau found similar stations at Le Terrier de la Roquette, commune of Berson; and Jolias, commune of Marcamps, both in Gironde.

### **Bize** (Aude)

Two caves (known locally as Grottes des Moulins), near Bize.
Explored by Tournal, Jean Miquel, *et al.*

**References:** Tournal Fils, *ASN*, xviii, 242–258 (1829); Rousseau, *Bull. Soc. hist. et nat. de Toulouse*, 363 (1874); Cartailhac, *Mat.*, xii, 319–326 (1877); G. and A. de Mortillet, *Préh.*, 648; Giraux, *AFAS*, 507–512 (Nîmes, 1912).

**Culture Sequence:**

3. Magdalenian
2. Solutrean, laurel-leaf points
1. Mousterian

### **Blaireaux, Les** (Yonne)

Cave near Saint-Moré.
Explored by the Abbé Parat.

**References:** Parat, *CIA*, 63–78 (Paris, 1900).

**Culture Sequence:**

2. Neolithic
1. Mousterian and later

This cave and others in the department of Yonne were explored by the Abbé Parat before a knowledge of Aurignacian culture had been definitely crystallized. The Aurignacian may be represented in many of these although not so stated by Parat; it certainly is present in the Grotte du Trilobite, for example.

### **Blanchard-des-Roches** (*see* **Les Roches**)

### **Blanzat** (*see* **Neschers**)

### **Bobache** (Drôme)

Station at the foot of a cliff near the Bobache tunnel, some 1,500 m. (0.9 mi.) from the village of Barraques; altitude about 700 m. (2,298 ft.). Discovered in 1893.

Explored by H. Müller, beginning in 1907.

**References:** Müller, *AFAS*, 2d ser., 1050–56 (Rheims, 1907); Müller, *CIA*, i, 558–565 (Geneva, 1913).

**Culture Sequence:**

4. Final Azilian
3. Azilian, painted pebbles
2. Final Magdalenian
1. Middle Magdalenian (latest phase)

**Boeufs, Les** (*see* **Lespugue**)

**Bois du Roc** (Charente)

Rock shelter in the commune of Vilhonneur, near the cave of Le Placard.
Explored by Delaunay.

**Culture Sequence:**

2. Bronze Age
1. Magdalenian

**Bos del Ser** (patois for Bois du Soir) (Corrèze)

Cave in the commune of Brive, discovered about 1904 by the Abbé Bardon.
Explored by Abbé Bardon, 1919–21.

**Culture Sequence** (Bardon):

2. Aurignacian
1. Aurignacian

**Boutmy-Muchembled** (*see* **Amiens**)

**Bultel-Tellier** (*see* **Amiens**)

**Brassempouy** (Landes)

Two caves, Grotte du Pape and Grotte des Hyènes.
Explored by Dubalen, Piette, de Laporterie, and Breuil.

**References:** Dubalen, *Mat.*, xvi, 284–287 (1881); Piette and Laporterie, *BSA*, 4th ser., v, 633–648 (1894); Piette, *ibid.*, 4th ser., vi, 659–663 (1895); Piette, *Anthr.*, vi, 129–151 (1895); Piette and Laporterie, *ibid.*, viii, 165–173 (1897); *ibid.*, ix, 531–555 (1898); Breuil, *RP*, ii, Nos. 6 and 7 (1907).

**Culture Sequence:**

I. Grotte du Pape (see Fig. 161)
- 5. Solutrean
- 4. Aurignacian
- 3. Aurignacian
- 2. Aurignacian
- 1. Aurignacian

II. Grotte des Hyènes
- 3. Solutrean
- 2. Aurignacian
- 1. Remains of hyena

The principal collections from Brassempouy are at Saint-Germain-en-Laye and in the museum at Mont-de-Marsan.

### **Bretteville** (La Manche)

Station in the open at Pointe du Heu, by the sea near Bretteville, 6 km. (3.75 mi.) from Cherbourg.

Explored by Henri Menut.

**References:** Menut, *Essai sur la station préh. de Bretteville*, 34 pp. and 26 plates (Cherbourg, 1886); Menut, *Extr. des Mém. Soc. nat. sci., nat. et math. de Cherbourg*, xxv, 225–256, 22 pls. (1886); Menut, *L'homme*, iii, 533–544 (1886).

**Stratigraphy** (Menut):
- 4. Robenhausian
- 3. Magdalenian
- 2. Mousterian
- 1. Chellean

Menut's work does not seem to have attracted much attention and may need revision in the light of more recent discoveries.

### **Bruniquel** (Tarn-et-Garonne and Tarn)

Five rock shelters and caves on the banks of the Aveyron: Lafaye and Plantade known as the rock shelters of Le Château, the adjoining rock shelter of Montastruc, the Grotte du Courbet or des Forges, and the Grotte des Batuts.

Explored by L. Martin, E. Trutat, Garrigou. Vicomte de Lastic (Grotte des Forges), Victor Brun and Peccadeau de l'Isle (Lafaye and Plantade), Peccadeau de l'Isle (Montastruc), Victor Brun (Grotte des Batuts), and E. Cartailhac.

**References:** Garrigou, *BSA*, iv, 651–652 (1863); Garrigou, *AS*, lvii, 1009–1013 (1863); Owen, *PT*, clix, 517–573 (1870); Peccadeau de

L'Isle, *R. Arch.*, xvii, 213–220 (1868); de Lastic, *CIA*, 119–122 (Paris, 1867); Cartailhac, *Anthr.*, xiv, 129–150, 295–315 (1903).

**Culture Sequence:**

I. Château rock shelters.
  1. Plantade
    *a*. Upper Magdalenian, harpoon
    *b*. Lower Magdalenian
  2. Lafaye
    *a*. Lower Magdalenian

In both rock shelters the Saiga antelope is characteristic of the fauna, hence the climate must have been very cold.

II. Grotte des Forges, several horizons all belonging to the Upper Magdalenian, with harpoons similar to those in the upper level at Plantade.

From the Grotte des Forges, de Lastic assembled two collections. The first was sent to the British Museum; the second is still in France and was published by Cartailhac in *l'Anthropologie* for 1903. Two engravings from this station are in the museum at Toulouse.

III. Grotte des Batuts, pre-Magdalenian with a fauna in which the horse and ox are dominant.
  5. Sterile layer
  4. Reddish layer, bones and flint implements
  3. Blackish layer, bones and flint implements
  2. Sterile layer, some charcoal
  1. Sandy layer, very few osseous remains

IV. Montastruc (rock shelter).

The two well-known pieces of sculpture, one representing two reindeer and the other a mammoth (dart thrower) are from Montastruc (see Figs. 102 and 129). These and other specimens from Montastruc are in the British Museum. The collections from the Grotte des Forges also went to the British Museum. The Brun collections from Lafaye and Plantade are in the museum at Montauban. Bruniquel collections are also to be found at Toulouse, at the Museum d'Histoire Naturelle in Paris, and at Saint-Germain-en-Laye.

**Cagny** (*see* **Amiens**)

**Cambous, Les** (Lot)

Rock shelter in the valley of the Célé.

Explored by Bergougnoux.

**References:** Bergougnoux, *Temps prêhs. en Quercy*, 33 (1887).

**Culture Sequence:**

2. Azilian, harpoons
1. Magdalenian, harpoons, bone needles, perforated teeth

The collection is in the museum at Cahors.

### **Cap-Blanc** (Dordogne)

Rock shelter in the valley of the Beune on the domain of Laussel, a short distance west of the great Laussel rock shelter (see Fig. 140).

Explored by Dr. Gaston Lalanne.

**References:** Lalanne, *RP*, v, No. 2, 16 pp. (1910); Lalanne and Breuil, *Anthr.*, xxii, 385–402 (1911); Capitan and Peyrony, *RA*, xxii, 439–442 (1912).

**Culture Sequence:**

3. Magdalenian
2. Sterile layer
1. Lower Magdalenian, numerous gravers, batons, bone needles, perforated teeth and shells; remains of reindeer especially abundant, horse, wolf, fox, lion, red deer, saiga antelope, *Bos*.

### **Cergy** (Seine-et-Oise)

Sand pit near Pontoise belonging to Mons. Dieudonné.

Explored by G. Dollfus (1884), A. Laville, *et al.*

**References:** Dollfus. *Mém. Soc. roy. malac. de Belgique*, xix, 40–43 (1884); Laville, *BSA*, 4th ser., ix, 56–69 (1898); *ibid.*, x, 80–88 (1899); Rutot, *MSAB*, xx, 57 pp. (1902).

**Stratigraphy:**

4. Magdalenian
3. Mousterian
2. Acheulian
1. Chellean, *Corbicula fluminalis*

Fauna: *Elephas antiquus*, *E. primigenius*, *Belgrandia gibba*, *Rhinoceros merckii*, *Cervus elaphus*, *Corbicula fluminalis*.

### **Chabot,** or **Jean-Louis** (Gard)

Cave in the commune of Aigueze, on the right bank of the Ardèche river and opposite the cave of Le Figuier.

Explored by L. Chiron.

**References:** Chiron. *Bull. Soc. anthr. de Lyon*, viii (1889); Valentin, *Mém. Acad. de Vaucluse*, ix, 344–348 (1890); Paul Raymond, *BSA*, 4th ser., vii, 643–645 (1896); Capitan, *REA*, xi, 49–51 (1901).

**Culture Sequence:**

2. Gallo-Roman
1. Magdalenian, mural engravings

### Chaffaud (Vienne)

Five caves on the Charente river in the commune of Savigné, 6 km. (3.75 mi.) above Civray. The most important is the Grotte du Puits.

Explored by André Brouillet père in 1834–45; Gaillard de la Dionnerie, 1864–65; Meillet, *et al.*, prior to 1860.

**References:** Brouillet and Meillet. *Epoques antediluviennes et celtiques du Poitou* (Paris, 1864); Cartailhac, *Anthr.*, xiv, 179–182 (1903); Chauvet, *Mém. Soc. antiq. de l'Ouest*, x, 1–176 (1918).

**Culture Sequence** (Grotte du Puits):

2. Neolithic
1. Upper Magdalenian, engravings (see Figs. 6 and 132)

The principal collections are at Poitiers, Saint-Germain-en-Laye, and the Salle Vibraye at the Natural History Museum, Paris.

### Chaise, La (Charente)

Cave in the commune of Vouthon.

Explored by Bourgeois and Delaunay.

**References:** de Vibraye, *AS*, lviii, 409–416 (1864); Bourgeois and Delaunay, *R., Arch.*, xii, 90–94 (1865); Tremeau de Rochebrune, *BSAHC*, 349–370 (1867), includes a prehistoric map of Charente; *CRC*, 225.

**Culture Sequence:**

I. South cave
   2. Magdalenian, engravings
   1. Solutrean
II. North cave.
   1. Mousterian

According to Déchelette, the deposits at La Chaise belong to the Aurignacian and Upper Magdalenian. Aurignacian fauna: *Rhinoceros tichorhinus*, *Ursus spelaeus*, *Hyaena spelaea*, horse, *Bison priscus*, reindeer.

### Champ de Mars (*see* Abbeville)

### Champs-Blancs, also known as Jean-Blanc (Dordogne)

Two rock shelters in the commune of Bourniquel: right shelter and left shelter.

Explored by Hardy and Chastaing, Landesque, Coste, Tabanou, Peyrony.

**References:** Peyrony, *AFAS*, 522–528 (Nîmes, 1912).

**Culture Sequence** (Peyrony): (the same for both shelters):

2. Lower Magdalenian
1. Upper Solutrean

Fauna: practically the same in both horizons—ox, horse, wild goat, stag, reindeer, etc., the reindeer predominating.

### Chancelade (*see* Raymonden)

### Chapelle-aux-Saints, La (Corrèze)

Cave (in local patois, La Bouffia) in the valley of the Sourdoire.

Explored by the Abbés A. and J. Bouyssonie and L. Bardon, Paul Bouyssonie.

**References:** A. and J. Bouyssonie and Bardon, *Anthr.*, xix, 513–518 (1908); Boule, *ibid.*, 519–525; xx, 257–271 (1909); Boule and Anthony, *ibid.*, xxii, 129–196 (1911); Boule, *AP*, vi, 111–172 (1911); *ibid.*, vii, 21–192 (1912); *ibid.*, viii, 1–70 (1913).

**Culture Sequence:** There is but a single horizon which has been referred to the Middle Mousterian. Human skeleton (see Figs. 225, 226 and 227).

### Château, Le (*see* Eyzies, Les)

### Châtelperron (Allier)

Station known locally as Cave aux Fées. Between 1840–45, the date of the construction of the railway in front of it, Poirier collected many fossil bones, also implements of bone and reindeer horn, but seems to have neglected stone implements. His collection was acquired by the Academy of Nat. Sci., Philadelphia.

Explored by Bailleau and Feningre prior to 1867.

**References:** Bailleau, *Mat.*, 384–388 (1869); Hamy, *Précis de paléont. humaine*, 263–264 (Paris, 1870); Breuil, *RA*, xxi, 29–40 (1911).

**Culture Sequence:** Typical Lower Aurignacian; a horizon that is also represented at Germolles (Saône-et-Loire), La Roche-au-Loup (Yonne), Gargas (Hautes-Pyrénées), and Haurets (Gironde).

### Chelles (Seine-et-Marne)

Gravel pits to the east of Chelles. Type station for Chellean Epoch.

Explored by Le Roy, Choquet, Reboux, G. de Mortillet, d'Acy, from 1877–83.

**References:** Chouquet, *Mat.*, 22–162 (1878); *ibid.*, 329–344 (1881).

**Stratigraphy:** (see Fig. 33)

8. Final Mousterian, recent loess
7. Mousterian, fine sand
6. Ancient Mousterian and Acheulian, coarse sand
5. Ancient Acheulian
4. Upper Chellean (principal Chellean horizon), calcined sands; warm fauna
3. Chellean, green marl
2. Lower Chellean, gravels, generally below water level
1. Tertiary sands

### Cluzeau, Le (Charente)

Cave in the commune of Ronsenac, near the village of Maine-aux-Anges, some 5 km. (3.1 mi.) south of Villebois-Lavalette.

Explored by Henri-Martin and J. Coiffard.

**References:** Coiffard, *BSAHC*, 5 pp. (1914).

**Culture Sequence:** The deposits have been disturbed but there are traces of an Aurignacian industry, including flints, bone point, hunter's tally of bone, etc.

Fauna: mammoth, lion, *Rhinoceros tichorhinus*, hyena, wolf, fox, reindeer. *Cervus megaceros* (?), bison, and horse.

### Colombière, La (Ain)

Rock shelter in the valley of the Ain, near Poncin.

Explored by Adrien Arcelin, Louis Moyret, Ch. Tardy, Lucien Mayet, and Jean Pissot.

**References:** Arcelin, *CIA*, 259–263 (Paris, 1867); Moyret, *Annales Soc. d'émulation de l'Ain* (1876); Lucien Mayet and Jean Pissot, *Abri-sous-roche préh. de la Colombière*, 205 pp. and 25 plates (Lyon, 1915).

**Culture Sequence:**

5. Proto-historic
4. Neolithic
3. Magdalenian
2. Sterile layer—1 m.

1. Earliest Magdalenian or final Aurignacian, many flint implements and chips; few bone implements; ornaments rare; engravings of *Ursus*, *Felis*, *Bison*, horse, *Rhinoceros*, reindeer, musk ox, deer, wild sheep, etc., on pebbles and bone; human figures engraved on bone

### Combarelles, Les, or Tounialou (Dordogne)

Cavern in the valley of the Beune near Les Eyzies, commune of Tayac (see Figs. 117 and 118).

Explored by Rivière, Breuil, Capitan, and Peyrony.

**References:** Rivière, *AFAS*, ii, 710–714 (Caen, 1894) Capitan and Breuil, *REA*, xii, 33–46 (1902); Capitan and Breuil, *BSA*, 5th ser., iii, 527–535 (1902); Peyrony, "Sur l'âge des dessins de la grotte des Combarelles (Dordogne)," *BA*, 212–215 (1909).

**Culture Sequence:**

4. Middle Magdalenian
3. Lower Magdalenian
2. Solutrean
1. Aurignacian

The corridor on the right, 28 m. (92 ft.) long, was explored by Rivière in 1892–94. In the floor deposits he found 150 bone needles, harpoons, sagaies, engraved reindeer horn, flint implements, and perforated shells. This culture Peyrony believes to be of the Lower and Middle Magdalenian age. The near-by cave of Rey was inhabited during the Mousterian, Aurignacian, and Solutrean Epochs. For this reason and on account of the nature of the work, he believes some of the mural art at Les Combarelles is of Aurignacian and Solutrean age, but that most of it belongs to the Lower and Middle Magdalenian Epochs.

### Combe, La (Dordogne)

Cave on the Mercier farm south of La Mouthe, in the valley of La Combe, a tributary of the Vézère.

Explored in 1912 by the author.

**References:** MacCurdy, *Amer. anthr.*, N.S., xvi, 157–184 (1914).

**Culture Sequence** (MacCurdy):

5. Surface soil—0.2 m.
4. Aurignacian, yellow clay—0.5 m. (See Figs. 69–72, 77 and 79)
3. Mousterian, yellow clay, cleavers—0.6 m. (See Figs. 57–60)
2. Archaic Mousterian, reddish, sandy clay—0.5 m.
1. Tertiary sands

From the Aurignacian deposit were obtained a bone point with cleft base, perforated shells, grooved and perforated animal teeth, and a perforated human lower molar (see Fig. 72). Human teeth as ornaments are rare. Coiffard later found one in a Paleolithic cave in Charente. Cotta describes a Neolithic burial from Provence [*HP*, iii, 74 (1905)] that contained a human carious tooth pierced for suspension.

### Combe-Capelle (Dordogne)

Rock shelters in the valley of the Couze near Montferrand-Périgord.
Explored by O. Hauser in 1909 (the principal one); a Mousterian rock shelter at a lower level has been explored by D. Peyrony.

**References:** Klaatsch and Hauser, *PZ*, i, 273–338 (1909)

**Culture Sequence** (rock shelter explored by Hauser):

9. Humus—0.5 m. (See Fig. 241)
8. Solutrean—0.6 m.
7. Sterile layer—0.3 m.
6. Upper Aurignacian (or Solutrean?), points with lateral notch at base—0.3 m.
5. Sterile layer—0.15 m.
4. Middle Aurignacian—0.25 m.
3. Sterile layer—0.15 m.
2. Lower Aurignacian (skeleton of *Homo aurignacensis*)—0.3 m (see Figs. 242–244)
1. Mousterian?—0.25 m. (Questioned by Breuil.)

### Conduché (Lot)

Cave in the valley of the Célé.
Explored by Bergougnoux.

**References:** Bergougnoux, *Temps préhs. en Quercy* (1887).

**Culture Sequence:**

2. Neolithic
1. Magdalenian, batons, harpoons, bone needles, dart thrower, engraving on bone

### Couze (Dordogne)

Rock shelter near the railway station of Couze.
Explored by Peyrony.

**Culture Sequence:**

2. Upper Mousterian
1. Lower Mousterian

### Cro-Magnon (Dordogne)

Rock shelter at Les Eyzies, commune of Tayac, discovered by Berthoumeyrou and Delmarès in March, 1868 (see Figs. 238–240).

Explored by E. Lartet and H. Christy; L. Lartet, E. Massenat, and P. Girod; E. Rivière and G. Berthoumeyrou; E. Cartailhac, H. Breuil, and D. Peyrony; L. Giraux.

**References:** Lartet and Christy, *Reliquiæ aquitanicæ*, 62–125 (London, 1865–75); Lartet, *BSA*, 2d ser., iii, 335–349 (1868); Paul Broca, *ibid.*, 350–392; Rivière, *ibid.*, 4th ser., viii, 503–508 (1897); Breuil, *RP*, ii, Nos. 6 and 7, 11 pp. (1907); Peyrony, *CPF*, 182–185 (Autun, 1907).

**Culture Sequence:**

7. Talus
6. Upper Aurignacian or later, unbroken series of hearths including the principal one; human bones
5. Sterile layer
4. Upper Aurignacian, hearth
3. Sterile layer
2. Upper Aurignacian, hearth
1. Sterile layer

Celebrated for the discovery of parts of five human skeletons—two male, one female, and fragments of two others. These have become the type for the so-called Cro-Magnon race.

In 1897 Berthoumeyrou and Rivière found engravings on bone, one representing a bison and one a woman in full-length profile. The deposits were at first supposed to be of Magdalenian age, but later were referred to the Aurignacian Epoch.

### Crouzade, La (Aude)

Cave at Gruissan near Narbonne.

Explored by Rousseau, Cartailhac.

**References:** Cartailhac, *Mat.*, xii, 324 (1877); Piette, *BSA*, 262–267 (1895).

**Culture Sequence:**

2. Azilian, painted pebbles
1. Magdalenian, engravings on bone

### Crozo de Gentillo (Lot)

Cave in the Combe-Cullier, commune of Lacave.

Explored by A. Viré.

**References:** Viré, *Anthr.*, xix, 409–424 (1908).

**Culture Sequence** (Viré):

3. Iron Age
2. Magdalenian, bone needles, batons, signs resembling hieroglyphs incised on stone and reindeer horn
1. Aurignacian

### Cutesson (Seine-et-Oise)

Three stations in the open on the property of Letrotteur, 2 km. (1.25 mi.) south of Rambouillet.

Explored by Letrotteur and Maurice Bourlon.

**References:** Bourlon, *HP*, iv, 13–19 (1906).

**Culture Sequence:** According to Bourlon, the three sites combined here have yielded Neolithic, Mousterian, and Chellean types, the Paleolithic types being confined to only two sites. He concludes therefore, that Cutesson had been inhabited for a long period of time. No details are given as to the actual superposition of cultures.

### Dufaure and Duruthy (*see* Sordes)

### Eglises, Les (Ariège)

Cave in the commune of Ussat.

Explored in part by Dr. Cuguillère.

**Culture Sequence:**

2. Neolithic sepultures
1. Paleolithic, mural drawings in red and black

### Enlène (Ariège)

Cave in the commune of Montesquieu-Avantes. At present, Enlène serves as an entrance to the cavern of Trois-Frères.

Explored since 1865, first by the Abbés Puech and Cau-Durban, recently by Count Begouen and his sons.

**References:** Begouen, *Anthr.*, xxiii, 287–305 (1912).

**Culture Sequence** (Begouen):

3. Bronze Age
2. Neolithic
1. Magdalenian

### Eyzies, Les (Dordogne)

I. Cave in the village of Les Eyzies, commune of Tayac, overlooking the Beune, a tributary of the Vézère. Situated 35 m. (115 ft.) above the bed

of the Beune. The cave has a maximum depth of 12 m. (39.4 ft.) and a breadth of 16 m. (52.5 ft.). The height of the ceiling at the center is 6 m. (19.7 ft.).

Explored by Lartet and Christy in August, 1863; by Girod, Massenat, Capitan, Breuil, and Peyrony.

**References:** Lartet and Christy, *R. Arch.*, ix, 241–253 (1864); Capitan, Breuil, and Peyrony, *CPF*, 137–142 (Périgueux, 1905); *ibid.*, *REA*, xvi, 429–441 (1906).

**Culture Sequence:**

3. Carlovingian
2. Magdalenian
1. Upper Solutrean

A reindeer vertebra which had been pierced through by a flint blade was discovered here by Lartet and Christy. Capitan, Breuil, and Peyrony found much red ocher in the refuse heap that had been removed from the cave by its occupants during the Middle Ages; also many engravings on bone, reindeer horn, and stone.

II. Abri du Château in the village of Les Eyzies. In 1913 when the old château was being restored, Peyrony found under large blocks of fallen rock that a portion of the Paleolithic deposits were still intact. The rest of the deposits had been destroyed when the château was built during the period from the eleventh to the thirteenth centuries. The parts of the château now restored have been converted into a state museum of prehistoric archeology. The section under the fallen rock, with its two Magdalenian levels *in situ*, is a valuable adjunct to the museum proper (see Fig. 4)

**Culture Sequence** (Peyrony):

3. Final Magdalenian
2. Sterile layer
1. Upper Magdalenian

### Ferrassie, La (Dordogne)

Rock shelter and cave in the commune of Savignac-du-Bugue.

Explored by Capitan and Peyrony as early as 1898, but principally in 1919–1921.

**References:** Capitan and Peyrony, *CPF*, 143–144 (Périgueux, 1905); Capitan and Peyrony, *REA*, xix, 403–409 (1909); *ibid.*, xxi, 148–150 (1911); *ibid.*, xxii, 29–50, 76–99 (1912); *ibid.*, xxxi, 92–112 (1921).

**Culture Sequence:**

I. Rock shelter
10. Upper Aurignacian
9. Middle Aurignacian, biconical bone points

8. Middle Aurignacian, slender bone points oval in section
7. Middle Aurignacian, flattened bone points
6. Middle Aurignacian, bone points with cleft base
5. Lower Aurignacian
4. Lower Aurignacian
3. Upper Mousterian, bone compressors
2. Middle Mousterian, bone compressors; human skeletons representing burials (see Fig. 65)
1. Acheulian (Lower or Warm Mousterian according to Wiegers)

II. Cave

3. Upper Aurignacian, figure stone, type of La Gravette
2. Middle Aurignacian
1. Middle Aurignacian, bone tube that might have held mixed paint

### Figuier, Le (Ardèche)

Cave at Saint-Martin d'Ardèche on the left bank of the Ardèche, opposite the cave of Chabot.

Explored by L. Chiron.

**References:** VALLENTIN, *Mém. acad. de Vaucluse*, ix, 344–348 (1890).

**Culture Sequence:**

3. Robenhausian
2. Magdalenian
1. Mousterian

### Figuier (Gard)

Cave on the left bank of the Gardon near Pont Saint-Nicolas (Route de Nîmes).

Explored by Laval.

**References:** LAVAL, *HP*, iv, 278–279 (1906).

**Culture Sequence:**

2. Neolithic
1. Paleolithic

### Font-Yves, La (Corrèze)

Cave in the Planche-Torte valley at the Château de Bassaler.

Explored by J. and A. Bouyssonie and L. Bardon.

**References:** J. and A. BOUYSSONIE and L. BARDON, *RA*, xxiii, 218–225 (1913); J. and A. BOUYSSONIE and L. BARDON, *Bull. Soc. sci. hist. et arch. de la Corrèze*, xlii (1920).

**Culture Sequence:**

2. Middle Aurignacian
1. Lower Aurignacian

Near Font-Yves are two caves: (1) Thevenard, which has furnished Solutrean industry and a stone lamp; and (2) Font-Robert.

### Forges, Les (*see* Bruniquel)

### Four de la Baume, Le (Saône-et-Loire)

Cave in the Ravine des Tranchées at Brancion near Tournus.
Explored by L. Mayet and J. Mazenot.

**References:** Mayet and Mazenot, *Le Four de la Baume, grotte préhistorique découverte à Brancion* (Saône-et-Loire). Br. in 8vo, 68 pp. (Paris, 1913).

**Culture Sequence:**

4. Iron Age
3. Bronze Age
2. Eneolithic, brachycephalic skull
1. Aurignacian, industrial remains; bones of mammoth, *Rhinoceros tichorhinus*, etc.

### Fournet, Le (Drôme)

Cave near Dié.
Explored by E. Laval.

**References:** Laval, Anthony, and Henri-Martin, *RA*, xxiv, 93–119 (1914).

**Culture Sequence:**

4. Neolithic, human skeletons
3. Sterile layer
2. Paleolithic, one chipped flint, human and animal bones
1. Compact yellow earth

### Gargas (Hautes-Pyrénées)

Cavern in the commune of Aventignan near Montréjeau.
Explored by Dr. Félix Garrigou (1870), Félix Regnault, Cartailhac, and Breuil.

**References:** Cartailhac, *AFAS*, ii, 717–722 (Lyon, 1906); Cartailhac and Breuil, *Anthr.*, xxi, 129–150 (1919); Cartailhac and Breuil, *AIB*, 213–216 (1907); Boule, *ibid.*, xxv, 227 (1914); Martel, *ibid.*, xxviii, 497–535 (1917).

**Culture Sequence:**

7. Layer of stalagmite
6. Upper Aurignacian, gravette points, gravers, baton, engravings on stone

5. Middle Aurignacian, carinate scrapers, bone points with cleft base
4. Final Mousterian and early Aurignacian
3. Fossil remains but no industry
2. Lower Mousterian, implements of quartzite *in situ*
1. Fossil remains but no industry

Mural art, especially negative imprints of the human hand in black and red (see Fig. 327); incised figures of the elephant, horse, and bison; also entrelacs, arabesques, etc.

### Gavechou (Charente)

Cave at Le Menieux near Edon.
Explored by G. Chauvet.

**References:** Chauvet, *BSAHC*, 221–303 (1896).

**Culture Sequence:**

3. Magdalenian
2. Solutrean
1. Mousterian

### Gelie, La (Charente)

Cave at Edon.
Explored by G. Chauvet.

**References:** Chauvet, *BSAHC* (1896).

**Culture Sequence:**

3. Roman
2. Robenhausian
1. Mousterian

### Gorge d'Enfer (Dordogne)

Caves and rock shelters in the commune of Tayac, on the right bank of the Vézère river, above the village of Les Eyzies. These caves were the first visited by Lartet and Christy upon their arrival in Dordogne in August, 1863. The largest, a great cave or rock shelter, had suffered the fate of many caverns which in 1793 were practically emptied in search of saltpeter for the manufacture of gunpowder. There are several small shelters which have yielded important archeological collections.

Explored by Lartet and Christy; Girod, Massenat, Peyrony, *et al.*

**References:** Lartet and Christy, *Reliq. aquit.*, 4, 35, 170, 245, 281 (1865–1875); Girod and Massenat, *CIA*, ii, 66 (1892); Girod, *REA*, x, 308–309 (1900); Breuil, *RP*, ii (1907); Peyrony, *AFAS*, ii, 804–806 (Lyon, 1906).

**Culture Sequence:**

I. Abri Pasquet
   2. Solutrean
   1. Aurignacian

The industrial remains at Abri Pasquet are said to be the same as those at Cro-Magnon and Coumba-del-Bouitou.

II. Abri du Poisson
   2. Upper Aurignacian
   1. Middle Aurignacian

Explored as early as 1892 by Girod. An engraving of a fish was discovered on the ceiling by Maurice Marsan in 1912. Owned by the French government.

III. Abri Lartet
   Aurignacian

IV. Grotte d'Oreille
   Solutrean

V. Grotte d'Abzac, right or south side
   Lower Magdalenian

VI. Abri Galou, right or south side
   Aurignacian

## **Gourdan** (Haute-Garonne)

Cave near Montréjeau; 21 m. (69 ft.) long, 16 m. (52.5 ft.) wide, with a maximum height of 6.8 m. (22.3 ft.).

Explored by E. Piette, beginning about 1870.

**References:** Piette, *BSA*, 2d ser., vi, 247–263 (1871); *ibid.*, viii, 384–425 (1873); *ibid.*, x, 279–296 (1875); Piette, *APAR* pls. ii, iv, vii–x, xxvii, xxx, lxviii, lxxxii–lxxxiv; Hamy, *RA*, 3d ser., iv, 268–270 (1889).

**Culture Sequence:**

4. Azilian (Piette thought he remembered having found a painted pebble near the top of the deposits)
3. Lower Magdalenian (or *Gourdanian*) (See Fig. 136.)
2. Solutrean
1. Mousterian, human maxillaries

Many implements made of imported flint, bone needles, harpoons, batons, many art objects; animal bones all broken for the extraction of marrow; fragments of human lower jaw and cranium, the latter classed as Magdalenian, found near the base of the deposits. The relic-bearing deposits had an average thickness of 6 m. (19.7 ft.).

The Piette collection is now in the National Museum of Antiquities at Saint-Germain-en-Laye.

### Grande-Gave (Savoie)

Cavern in the commune of La Balme.
Explored by Baron A. Blanc.

**References:** Blanc, *CIA*, i, 572–579 (Geneva, 1913).

**Culture Sequence:**

3. Eneolithic hearths (transition from the Neolithic to the Age of Metals)
2. Azilian
1. Magdalenian (?), human bones

### Grange, La (*see* Laugerie-Basse)

### Grenelle (Paris)

Sand and gravel pit in the fourth or lowest terrace of the Seine valley. Explored by Émile Martin and Eugene Bertrand.

**References:** E. Belgrand, *La Seine. Le bassin parisien aux âges antehistoriques* (Impr. imperiale, 1869); Rutot, *BSBG*, xxiv (1910); Rutot, *La Préhistoire* (Brussels, 1918).

**Stratigraphy** (adapted from Rutot):

5. Vegetal earth
4. Stony layer
3. Recent loess
2. Gravel, flint implements near top; cold fauna; brachycephalic human crania
1. Gravel, (*b*) human cranium and Chellean industry near top; tropical fauna; (*a*) fragment of human cranium resembling Galley Hill skull near bottom.

### Hauteroche (Charente)

Rock shelter called Grotte à Melon about 2 km. (1.25 mi.) from Châteauneuf, near the village of Hauteroche.
Explored by G. Chauvet, L. Didon, *et al.*

**References:** Chauvet, *BSAHC* (1912).

**Culture Sequence:**

5. Aurignacian
4. Upper Mousterian, blades, cleavers
3. Sterile layer
2. Middle Mousterian, bone compressors, cleavers, scrapers
1. Middle Mousterian, ocher

The flint industry of Hauteroche resembles very closely that of La Quina, even to the patina.

### L'Herm (Ariège)

Cave 8 km. (5 mi.) from Foix. The name is derived from a Latin word meaning desert, solitude.

Explored by Alzieu in 1855; B. Rames, F. Garrigou, Abbé Puech, and H. Filhol in 1862; J. B. and F. T. Noulet in 1862 and later.

**References:** Noulet, *Mat.*, x, 1–23 (1875); Noulet, *Mém. Acad. sci. inscr. et belles-lettres de Toulouse*, 7th ser., vi, 497–516; Cartailhac and Boule, *Anthr.*, v, 1–14 (1894).

**Culture Sequence:**

2. Neolithic, polished stone axes, sherds, human skeletons
1. Acheulian or Mousterian

The cave of l'Herm is noted for cleavers of quartzite and for quantities of the remains of the cave bear and cave lion, including entire skeletons.

### L'Homme (*see* Arcy)

### Hoteaux, Les (Ain)

Cave near Rossillon.

Explored by the Abbé Tournier and Charles Guillon.

**References:** Tournier and Guillon, *Les hommes préhistoriques dans l'Ain* (Bourg, 1895); *ibid.*, *Les abris de Sous-sac et les Grottes de l'Ain à l'époque néolithique* (Bourg, 1903); d'Acy, *R. Arch.*, 3d ser., xxvi, 240–244 (1895); d'Acy, *BSA*, 4th ser., vi, 388–395, 419–426 (1895); Chantre, *L'homme Quaternaire dans le bassin du Rhône* (Paris, J. B. Ballière et Fils, 1901)

**Culture Sequence:**

I. Terrace deposits, 2.35 m. thick
   7. Humus
   6. Magdalenian
   5. Magdalenian
   4. Magdalenian, perforated baton with engraving of stag
   3. Magdalenian
   2. Magdalenian
   1. Proto-Magdalenian, sepulture with extended skeleton enveloped in red ocher; accompanied by perforated tooth of stag, chipped flints, and a plain baton

Fauna: reindeer most abundant, especially in the lower hearths; stag more abundant in upper than in lower hearths; *Capra ibex*, *Sus scrofa*,

*Arctomys, Marmotta, Castor fiber, Lepus timidus, Cervus alces, Hyaena spelaea, Meles taxus,* small carnivors, and birds.

II. Cave deposits
6. Neolithic, pottery
5. Hearths, chipped flints
4. Yellow sands
3. Magdalenian, hearth
2. Glacial deposit
1. Reddish sands

### **Isturitz** (Basses-Pyrénées)

Cave near the village of Isturitz, some 10 km. (6.25 mi.) east of Hasparren.

Explored by E. Passemard.

**References:** Passemard, *BSPF*, x, Nov. 27, 1913; *ibid.*, xiii, Mar. 23, 1916; *ibid.*, xiv, Feb. 27, 1917; *ibid.*, xvii, Mar. 25, 1920; *ibid.*, *R. Arch.*, xv, 1–45 (1922).

**Culture Sequence** (Passemard):

11*c*. Final Magdalenian, harpoons of reindeer horn
11*b*. Middle Magdalenian
11*a*. Lower Magdalenian
11. Solutrean
10. Sterile clay deposit
9. Solutrean
8. Sterile clay deposit
7. Upper Aurignacian
6. Middle Aurignacian, perforated animal teeth
5. Aurignacian, bone points with cleft base
4. Upper Mousterian, bone compressors
3. Hyena occupation
2. Cave bear occupation
1. Upper Mousterian

Numerous portable art objects were found in the deposit 11*a*–11*c*.

### **Lacave** (Lot)

Cave near the village of Lacave on the highway between Souillac and Rocamadour.

Explored by A. Viré in 1902.

**References:** Viré, *Anthr.*, xvi, 411–429 (1905).

**Culture Sequence:**

6. Magdalenian, hearths
5. Magdalenian, engraving of antelope head on reindeer horn
4. Middle Solutrean, willow-leaf flint points with lateral notch at base
3. Lower Solutrean, laurel-leaf points
2. Lower Solutrean, hearths
1. Lower Solutrean, baton of reindeer horn

Other objects found include bone needles, perforated teeth, harpoon, engraved baton, bone implements, flint implements, perforated pebble. Total thickness of deposits, 7 m. (23 ft.).

**Lacoste** (see Planche-Torte)

**Laugerie-Basse** (Dordogne)

Rock shelters near Les Eyzies: the classic station of Laugerie-Basse (including La Grange); de Vibraye; and Marseilles 150 m. (492.5 ft.) to the north. (See Fig. 155.)

Explored by Lartet and Christy, Paul Girod, E. Massenat, Ph. Lalande, Cartailhac, Bourlon, O. Hauser, A. Viré, A. Le Bel, D. Peyrony, J. Maury.

**References:** Lartet and Christy, *R. Arch.*, ix, 256–261 (1864); Lartet and Christy, *Reliq. aquit.* (1865–1875); Massenat, Lalande, and Cartailhac, *AS*, lxxiv, 1060–1063 (1872); Paul Girod and Elie Massenat, *Les stations de l'âge du renne dans les vallées de la Vézère et de la Corrèze*, i, 110 pls. (Paris, 1900); Cartailhac and Breuil, *Anthr.*, xviii, 10–36 (1907); Peyrony and Maury, *RA*, xxiv, 134–154 (1914); Bourlon and Breuil, *Anthr.*, xxvii, 1–26 (1916).

**Culture Sequence:**

I. La Grange
   6. Neolithic
   5. Azilian
   4. Final Magdalenian
   3. Upper Magdalenian
   2. Middle Magdalenian
   1. Lower Magdalenian

Implements of stone and of bone, an engraved stone, and engravings on reindeer horn were found at La Grange by Hauser.

II. Marseilles
   14. Gallo-Roman
   13. Iron Age (traces only)
   12. Bronze Age (traces only)
   11. Robenhausian (Neolithic)

10. Sterile deposit
9. Azilian
8. Sterile deposit
7. Upper Magdalenian, harpoons with two rows of lateral barbs
6. Sterile deposit
5. Upper Magdalenian, harpoons, generally with single row of well-developed lateral barbs
4. Sterile deposit
3. Middle Magdalenian, harpoons with single row of lateral barbs
2. Sterile deposit
1. Lower Magdalenian

A rich stone industry, including a lamp, was found at Marseilles by Hauser. Back of and above the rock shelter is a cavern which was employed as a refuge in Magdalenian times. The principal collections from Marseilles are in the museum at Laugerie-Basse and in the possession of Mons. Le Bel, Paris.

In respect to portable art objects, the classic station of Laugerie-Basse is perhaps the richest of all Paleolithic stations. Finds include: reindeer carved from reindeer horn, the so-called poniard; statuette in ivory, "Venus impudique"; engraving on schist, "combat de rennes"; engraving, "femme au renne" with engraving of horse on the reverse side; engraving, "chasse à l'aurochs." For more than twenty years Massenat continued his researches here. It was he who collected the numerous engravings, which now form a part of the Girod collection belonging to the Museum of National Antiquities at Saint-Germain. A Magdalenian human skeleton was found here.

### Laugerie-Haute (Dordogne)

Two rock shelters near Les Eyzies: the classic one, Laugerie-Haute; and the Abri Leysalles.

Explored by Lartet and Christy in August, 1863; de Vibraye; Massenat and Girod; Rivière; Capitan and Breuil; Hauser; Peyrony.

**References:** Lartet and Christy, *R. Arch.*, ix, 254–256 (1864); Girod and Massenat, *CIA*, ii, 65–66 (1892); Capitan and Breuil, *AFAS*, ii, 771–773 (Montauban, 1902); Paul Girod, *Les stations de l'âge du renne dans les vallées de la Vézère et de la Corrèze. Stations Solutréennes et Aurignaciennes*, 100 pls. (Paris, 1906).

**Culture Sequence** (Peyrony) (classic station):

6. Robenhausian
5. Magdalenian (See Fig. 134.)
4. Upper Solutrean
3. Lower Solutrean
2. Aurignacian
1. Mousterian

Laugerie-Haute is rich in Solutrean lithic industry (the laurel leaf and the *pointe à cran*). It was here that G. de Mortillet noted for the first time the superposition of the Magdalenian on the Solutrean.

### Laussel (Dordogne)

Rock shelter in the valley of the Beune, on the domain of Laussel, commune of Marquay.

Explored by E. Rivière in 1894; Capitan and Peyrony; but chiefly by Gaston Lalanne from 1908–1912.

**References:** Breuil, *RP*, iv, Nos. 8 and 9 (1909); Lalanne, *Anthr.*, xxii, 257–260 (1911); *ibid.*, xxiii, 129–149 (1912); Wiegers, *ZE*, xlvi, 829–865 (1914).

**Culture Sequence:**

I. (Lalanne and Breuil):
- 10. Surface fill
- 9. Upper Solutrean } 0.6 m.
- 8. Lower Solutrean }
- 7. Sterile layer—0.9 m.
- 6. Upper Aurignacian, bas-reliefs—0.8 m. (See Figs. 162 and 165.)
- 5. Sterile layer—1.2 m.
- 4. Middle Aurignacian—0.65 m.
- 3. Sterile layer—0.8 m.
- 2. Mousterian—0.75 m.
- 1. Acheulian—0.1 m.

II. (Wiegers):
- 6. Upper Solutrean
- 5. Lower Solutrean
- 4. Upper Aurignacian
- 3. Middle Aurignacian
- 2. Mousterian { cold fauna / warm fauna
- 1. Acheulian

This rock shelter faces the south, has a total length of 126 m. (413.7 ft.) and an average depth of 15 m. (49.2 ft.). Total thickness of deposits, 5.8 m. (19 ft.). It was found to be rich in industrial remains, in addition to the remarkable Aurignacian stone bas-reliefs representing the human form, both male and female. Bas-reliefs to the number of at least five were found during the Lalanne excavations. The best known is the "Venus of Laussel" holding a bison horn. The figure had been painted, some of the ocher being still visible. One of two others belonging to the same female type is in the Berlin *Museum für Völkerkunde*. A fourth relief is that of an athletic male figure, a good physical type as opposed to the

symbolic female type. Finally there is a group of two figures, one of which is a female, the other probably a male. (See Figs. 162, 165 and 166.)

### Lespugne or Lespugue (Haute-Garonne)

Grotte des Harpons, Grotte des Boeufs, Grotte des Rideaux, rock shelter of Lespugue, 18 km. (11.2 mi.) east of Saint-Gaudens.

Explored by Dr. R. de Saint-Périer.

**References:** Saint-Périer, *BMSA*, 6th ser., iii, 48–49, 149–153, 399–404 (1912); Saint-Périer, *BSPF*, ix, 210–211, 498–518 (1912); Saint-Périer, *HP*, No. 12 (1912); Saint Périer, *Anthr.*, xxx, 209–234 (1920); *ibid*, xxxii, 361–381 (1922).

**Culture Sequence** (Saint-Périer):

I. Grotte des Harpons
- 9. Gallo-Roman and pre-Roman, sherds; bronze implement
- 8. Azilian or final Magdalenian, stone and bone implements, harpoons of stag (red deer) horn. Fauna: horse, reindeer, red deer, fox, pig, marmot, several species of birds: *Nyctea nivea*, *Lagopus*, etc.
- 7. Upper Magdalenian, stone and bone implements, engravings, and harpoons of reindeer horn
- 6. Sterile layer
- 5. Magdalenian, stone and bone implements, pendants, engravings, sculpture in bas-relief similar to that at Arudy and Lourdes; fauna: same as No. 8 except pig and marmot; *Canis lupus*, mollusks from the Atlantic and Mediterranean
- 4. Sterile layer
- 3. Lower Magdalenian, stone and bone implements, two engravings, perforated teeth and shells; fauna same as No. 8 except for pig; *Canis lupus*, *Hyaena*, *Felis*, perforated shell of *Arca polii* (Mediterranean)
- 2. Sterile layer, except for unbroken bones of wolf and reindeer
- 1. Upper Solutrean, willow-leaf and laurel-lead points, long sagaies made of bone; fauna: reindeer, *Canis lupus*, mammoth

II. Grotte des Boeufs
- 2. Magdalenian, bone needles; figure of a fish with contours cut away
- 1. Not yet explored

III. Grotte des Rideaux
- 5. Middle Ages
- 4. Gallo-Roman
- 3. Hallstatt Epoch
- 2. Upper Aurignacian, ivory Venus (see Fig. 159), bone javelin points of the Aurignac type, chipped flints
- 1. Clay with bones of *Ursus spelaeus*

**Levallois-Perret** (Seine)

Sand and gravel pit near Paris.
Explored by Reboux and others.

**References:** Reboux, *BSA*, 2d ser., viii, 5–30 (1873); Roujou, *ibid.*, 2d ser., ix, 295–297 (1874).

**Stratigraphy** (Reboux):

3. Neolithic (epoch of the dolmens)
2. Paleolithic, reindeer fauna
1. Paleolithic, fauna of the mammoth

**Liveyre** (Dordogne)

Cave in the commune of Tursac, across the Vézère from La Madeleine.
Explored by E. Rivière.

**References:** Rivière, *CPF*, 1st session, 490–491 (Périgueux, 1905); MacCurdy, *Amer. Anthr.*, N.S., xxv, 72–89 (1923); Paul de Givenchy, *BSPF*, xx, 166–170, 1923.

**Culture Sequence** (Rivière):

2. Magdalenian
1. Solutrean

**Longueroche** (Dordogne)

Rock shelter near Le Moustier.
Explored by O. Hauser.

**Culture Sequence:**

2. Azilian (traces)
1. Magdalenian

**Lortet,** or **Lorthet** (Hautes-Pyrénées)

Cavern in the valley of the Neste, discovered by Piette in 1872; 15 m. (49.2 ft.) wide at entrance, 20 m. (65.7 ft.) long.
Explored by Piette, Cartailhac, and Trutat.

**References:** Piette, *BSA*, 2d ser., ix, 298–317 (1874); Piette, *Mat.*, 3d ser., iv, 362 (1887); Piette, *APAR*, pls. ii, iv, vii, x, xxx, xxxix–xlii, xlvii, lx.

**Culture Sequence:**

2. Azilian, harpoons of staghorn
1. Upper Magdalenian (or *Lorthetian*), small discoidal flint scrapers, harpoons of reindeer horn with cylindrical shafts, bone

needles, engravings on stone and reindeer horn (see Fig. 127); reindeer rare

### **Lourdes,** or **Lourde** (Hautes-Pyrénées)

Cave called L'Espelunge or Les Espélugues.

Explored by A. Milne Edwards, Lartet and Christy in 1861, Léon Nelli, Piette.

**References:** Milne Edwards, *ASN*, xvii (1862); Piette, *BSA*, 4th ser., iii, 436–442 (1892); Piette, *APAR*, pls. ii, xi–xv, xvii–xxvi, xxxii–xxxviii, xcviii–c.

**Culture Sequence** (Déchelette):

2. Azilian
1. Magdalenian (See Figs. 133 and 172.)

After Milne Edwards and Lartet, others visited the cave but their excavations were of too short duration to be of importance. Then came an unfortunate decision on the part of the Fathers of the Cave of the Immaculate Conception to empty the cave in order to obtain space for the installation of two saints. The materials removed were used in part to fill in a garden and in part to improve a roadway. Later there appeared on the scene Léon Nelli, who discovered a remnant of the original Magdalenian deposit filling a niche; in this he found the now well-known figure of a horse. Encouraged by this turn of events, he explored the fill in the roadway, from which he had the good fortune to rescue a splendid collection of sculptured figures, engravings, and implements of various kinds to the number of over 2,000. The principal collections are in the museum at Saint-Germain-en-Laye and at Toronto.

### **Madeleine, La** (Dordogne)

Rock shelter (see Figs. 93 and 94) on the right bank of the Vézère in the commune of Tursac. After Laugerie-Basse, one of the richest stations in portable art (see Figs. 104 and 173).

Explored by Lartet and Christy in 1863 or 1864; Peyrony, *et al.*

**References:** Lartet and Christy, *R. Arch.*, ix, 253–254 (1864); Lartet and Christy, *Reliq. aquit.*, 5, 20, 137, 168, 206, 245, 255, 265 (1865–75).

**Culture Sequence:**

3. Upper Magdalenian
2. Middle Magdalenian
1. Lower Magdalenian

**Mairie, La** (*see* **Teyjat**)

**Mammouth, Le** (Yonne)

Cave near Saint-Moré.
Explored by the Abbé Parat.

**References:** Parat, *CIA*, 63–78 (Paris, 1900); Parat, *Anthr.*, xii, 120 (1901).

**Culture Sequence** (Parat):

3. Neolithic
2. Aurignacian (?)
1. Mousterian

**Marignac** (Gironde)

Valley deposit in the commune of Tauriac.
Explored by François Daleau.

**References:** Daleau, *Actes Soc. lin. de Bordeaux*, 6th ser., lviii, 321–331 (1903); *cf. HP*, v, 89–90 (1907).

**Stratigraphy** (Daleau):

4. Neolithic
3. Mousterian
2. Acheulian
1. Chellean

**Marmotte, La** (Yonne)

Cave near Saint-Moré.
Explored by the Abbé Parat.

**References:** Parat, *CIA*, 63–78 (Paris, 1900); Parat, *Anthr.*, xii, 120–121 (1901).

**Culture Sequence** (Parat):

3. Neolithic
2. Magdalenian
1. Aurignacian (?)

**Marnière de Vilette** (Loiret)

Surface station near Vilette, 7 km. (4.3 mi.) from the station of Le Muids.
Explored by M. Bourlon.

**References:** Bourlon, *RP*, i, No. 9 (1906).

**Culture Sequence:**

3. Vegetal earth
2. Early Neolithic
1. Magdalenian

**Marseilles** (*see* **Laugerie-Basse**)

**Mas d'Azil** (Ariège)

A great subterranean gallery following the course of the Arise river for a distance of 400 m. (1,313 ft.) through a limestone formation. There are two stations, one on the right bank and one on the left, the latter being the type station for the Azilian Epoch. (See Fig. 255.)

Explored by F. Garrigou, E. Piette, F. Regnault, E. Cartailhac, Count Begouen, H. Breuil.

**References:** Garrigou, *BSGF*, 2d ser., xxiv, 492–497 (1867); Regnault, *Bull. Soc. hist. nat. Toulouse* (1876); Cartailhac, *Anthr.*, ii, 141–149 (1891); Piette, *ibid.*, v, 129–146 (1894); *ibid.*, vi, 276–292 (1895); *ibid.*, vii, 1–17, 309, 385–427 (1896); *ibid.*, xiv, 641–653 (1903); *ibid.*, xvi, 1–11 (1905); Piette, *BMSA*, 5th ser., iii, 771–779 (1902); Piette, *APAR*, pls. xxxi, xliii–xlvi, xlviii–lix, lxi–lxvii, lxix, xciv–xcvii; Breuil, *BA*, 23 pp. (1902); *ibid.*, 421–436 (1903); Begouen and Breuil, *Bull. Soc. arch. du Midi France*, 4 pp. (June 17, 1913).

**Culture Sequence:**

I. Right bank
- 2. Upper Magdalenian (*Rangiferian* of Piette)
- 1. Lower Magdalenian (*Equidian* of Piette)

II. Left bank
- 9. Iron Age
- 8. Bronze Age
- 7. Early Neolithic
- 6. Azilian, painted pebbles, (see Figs. 256 and 257)
- 5. Magdalenian
- 4. Magdalenian
- 3. Magdalenian
- 2. Magdalenian
- 1. Magdalenian, hearths

The opening of the gallery at the south end or entrance has a breadth of 51 m. (167.4 ft.) and a height of 48 m. (157.5 ft.). It presents a splendid spectacle not unlike a great cathedral with the façade removed. The cavern was a place of refuge during the religious wars, and saltpeter for the manufacture of gunpowder was obtained from its deposits.

The Paleolithic art objects from Mas d'Azil include many of the first importance (see Fig. 168). The chief collection is at Saint-Germain-en-Laye; there is also a collection at the Mairie in the village of Mas d'Azil.

### Masnaigre (Dordogne)

Rock shelter in the commune of Marquay, near Laussel.
Explored by Bourlon, beginning in 1909.

**References:** Bourlon, *RA*, xxiii, 254–268 (1913).

**Culture Sequence** (Bourlon):

3. Aurignacian, hearths
2. Aurignacian, hearths, gravette type of flint blade
1. Middle Aurignacian, hearths, Bouitou type

### Massat (Ariège)

Two caves, an upper and a lower, at Massat.
Explored by A. Fontan, Lartet and Christy, Garrigou.

**References:** Fontan, *AS*, xlvi, 900–903 (1858); Lartet, *ASN*, 4th ser xv, 177–253 (1861); Garrigou, *BSA*, 2d ser., i, 438–440 (1866); H. L Hon, *L'homme fossile*, 2d edit. (Paris, 1868).

**Culture Sequence:**

2. Azilian
1. Magdalenian

Noted for engraving of a bear on a pebble (upper cave); and of a bear head on a baton of staghorn (lower cave).

### Mège (*see* Teyjat)

### Menchecourt (*see* Abbeville)

### Metreville (Eure)

Rock shelter known as the Abri du Mammouth, situated 30 m. abov the level of the Seine at the village of Metreville, commune of Saint-Pierr d'Autils.
Explored by Georges Poulain in 1903–1905.

**References:** Poulain, *CIA*, 430–444 (Monaco, 1906).

**Culture Sequence** (Poulain):

5. Neolithic, flint implements, potsherds; remains of red dee *Cervus capreolus, Sus scrofa, Canis domesticus;* vegetal earth 0.35–2 m.
4. Neolithic (Campignian), bone spatula, flint implements includi a tranchet and scratchers; red deer, *Sus scrofa, Cervus capreolu Bos taurus;* human lower jaw; reddish earth—0.35–0.5 m.

3. Magdalenian, flint blades; *Sus scrofa*, red deer; loess—0.5–1.1 m.
2. Magdalenian, flint blades; reindeer, mammoth
1. Sterile layer

### Micoque, La (Dordogne)

Fallen rock shelter in the commune of Tayac.

Explored by E. Rivière, Chauvet, Cartailhac, Capitan, Peyrony, Hauser, Wiegers, *et al.*

**References:** Chauvet and Rivière, *AS*, cxxiii, 401–403 (1896); Chauvet and Rivière, *AFAS*, 697 (Saint-Etienne, 1897); Capitan, *REA*, vi, 406–416 (1896); Hauser, *HP*, vi, 9 pp (1908); Peyrony, *REA*, xviii, 380–382 (1908).

**Culture Sequence:**

3. Upper Acheulian, beautiful pointed cleavers, (see Fig. 47); horse abundant
2. Rubbish resembling breccia, almost sterile
1. Atypic Acheulian, horse, *Bos*, *Cervus elaphus*. Wiegers claims to have found *Rhinoceros merckii*, presumably at this level

### Montastruc (*see* Bruniquel)

### Montfort (Ariège)

Rock shelters on the Salat river north of Saint-Girons, opposite the village of Saint-Lizier.

Explored by Ed. Filhol, Miquel, F. Regnault.

**References:** Regnault, *Rev. des Pyrénées*, v. Nos. 5 and 6 (1893); Cartailhac, *Anthr.*, vii, 309–318 (1896); Begouen, Cuguillère, and Miquel, *RA*, xxxii, 230–232 (1922).

**Culture Sequence** (Cartailhac):

3. Neolithic
2. Azilian
1. Magdalenian, engravings on stone and bone

Noted for small harpoons found elsewhere only at the Grotte des Forges at Bruniquel and the rock shelter of Raymonden at Chancelade; also for the vertebra of a deer pierced by a flint weapon; and a human vertebra (see Fig. 319) pierced by a quartzite implement (found in talus near the cave).

**Montières** (*see* **Amiens**)

**Moru** (Seine-et-Oise)

Sand and gravel pit in the Oise valley (above the Cergy pit). Explored by d'Ault du Mesnil, *et al.*

**Stratigraphy** (Breuil):

2. Mousterian, recent loess
1. Chellean, gravels

**Moulin-Quignon** (*see* **Abbeville**)

**Moustier, Le** (Dordogne)

Rock shelters or caves in the commune of Peyzac: the classic station from which the Mousterian Epoch takes its name is 200 m. (656.6 ft.) from the Vézère river, and 24 m. (78.8 ft.) above it; there is also a lower station. (See Fig. 54.)

Explored by Lartet and Christy in Nov. 1863, Bourlon, Peyrony, Hauser.

**References:** Lartet and Christy, *R. Arch.*, ix, 238–239 (1864); Lartet and Christy, *Reliq. aquit.* (1865–75); Klaatsch and Hauser, *AA*, N.F., vii, 287–297 (1909); Bourlon, *RP*, v, No. 6, 11 pp. (1910); *ibid.*, vi, 20 pp. (Oct.–Dec., 1911); Peyrony, "Après une grande crue préh. de la Vézère," *Rev. géogr. commerciale*, 7 pp. (Bordeaux, 1914).

**Culture Sequence** (Peyrony):

I. Classic station
   7. Upper Aurignacian
   6. Lower Aurignacian
   5. Late Mousterian
   4. Layer of waterworn objects
   3. Upper Mousterian

II. Station at lower level, (see Figs. 55 and 56)
   7. Middle Aurignacian
   6. Lower Aurignacian
   5. Late Mousterian
   4. Layer of waterworn objects
   3. Upper Mousterian
   2. Mousterian, cleavers; human skeleton
   1. Mousterian

**Mouthe, La** (Dordogne)

Cavern at the village of La Mouthe, commune of Tayac, a little more than 1 km. (0.6 mi.) south of Les Eyzies.

Explored by E. Rivière.

**References:** Rivière, *AS* (1895–1897, 1901–1903); Rivière, *Rev. scientifique*, 526(1896); *ibid.*, 492 (1901); Rivière, *BSA*, 4th ser., viii, 302–329 (1897); *ibid.*, x, 554–563 (1899); Rivière, *BMSA*, 5th ser., ii, 509–517 (1901); *ibid.*, 5th ser., iv, 191–196 (1903); Rivière, *Les parois gravées et peintes de la grotte de la Mouthe* (Paris, 1903, 2d edit., 1905); Riviére, *HP*, i, No. 3 (1903).

**Culture Sequence:**

5. Neolithic
4. Magdalenian
3. Solutrean (de Mortillet)
2. Aurignacian
1. Mousterian

The cavern of La Mouthe was seen by Rivière for the first time in 1894. Edouard and Gaston Berthoumeyrou, workmen employed by Rivière, entered the cavern in April, 1895, and discovered the first engravings. At that time the entrance was so small that one could pass only by crawling. The cavern is a narrow, natural corridor, 220 m. (722.3 ft.) in length. The mural art begins at a distance of 93 m. (305.3 ft.) from the entrance and continues at intervals to a depth of 128 m. (420.3 ft.). The figures comprise simple engravings as well as those to which red or black color has been added. They include the mammoth, wild goat, bison, horse, etc. In the Upper Paleolithic deposits, at a distance of about 7 m. (23 ft.) from the entrance, a stone lamp was found in 1899. On the outer surface or back of this lamp is an engraved figure of the wild goat (see Fig. 141).

### **Murat** (Lot)

Rock shelter near Rocamadour.
Explored by the Abbé A. Lemozi.

**Culture Sequence:** Seven layers of Magdalenian deposits, in all of which harpoons and bone needles are found.

### **Muids, Le** (Loiret)

Surface station on the plateau of Sologne.
Explored by A. M. Munsch from 1900.

**References:** Bourlon, *RP*, i, No. 9 (1906).

**Culture Sequence** (Bourlon):

3. Vegetal earth
2. Early Neolithic
1. Magdalenian

Breuil considers that the lowest layer is Azilian.

**Neschers** (Puy-de-Dôme)

Rock shelter at Blanzat on the slopes of Mount Tartaret.
Explored by the Abbé Croizet, Pommerol, Boule, *et al.*

**References:** Pomel, *BSGF*, 1st ser., xiv, 206 (1843); Pommerol, *AFAS*, ii, 661–668 (1876); Boule, *La géogr.*, xiii, 359–363 (1906).

**Culture Sequence:**

3. Magdalenian, engraving of horse on reindeer horn
2. Volcanic deposit
1. Mousterian

**Niaux** (Ariège)

Great cavern in the commune of Niaux, near Tarascon.
Explored by Cartailhac, Breuil, *et al.*

**References:** Cartailhac and Breuil, *Anthr.*, xix, 15–46 (1908).

**Culture Sequence:**

2. Neolithic, pottery
1. Paleolithic, mural art

**Ombrive, L'** (Ariège)

Cavern near Niaux, first visited by Noulet in 1826.
Explored by Noulet in 1862, Garrigou, Rames, Filhol, *et al.*

**References:** Noulet, *Archives du Musée hist. nat. Toulouse*, 89–128 (1882).

**Culture Sequence:**

3. Bronze Age
2. Neolithic
1. Paleolithic, mural art

**Olha** (Basses-Pyrénées)

Rock shelter on the left bank of the Olha, near Cambo.
Explored by E. Passemard.

**References:** Passemard, *AFAS*, 553–560 (Strasbourg, 1920).

**Culture Sequence:**

9. Upper Mousterian, scrapers, points, bone compressors, all abundant; same fauna as in No. 7
8. Sterile layer
7. Upper Mousterian, small scrapers and points; reindeer, *Rhinoceros tichorhinus*, *Cervus elaphus*, horse, ox

6. Sterile layer
5. Mousterian, scrapers, points, bone compressors rare, no cleavers; *Cervus elaphus*, horse, ox
4. Sterile layer
3. Mousterian, hearths and abundant industry, small flint cleavers, fine scrapers, bone compressors; *Rhinoceros merckii*, *Cervus elaphus*, *Bos*, horse, *Hyaena*
2. Mousterian, cleavers, scrapers, bone compressors; *Rhinoceros merckii*, *Cervus elaphus*, *Bos*, horse, *Hyaena spelaea*
1. Atypic Mousterian, *Bos*, *Cervus* akin to *C. elaphus*

### Pair-non-Pair (Gironde)

Cave at Marcamps.
Explored by François Daleau following discovery by him in 1881.

**References:** Daleau, *Actes Soc. arch. Bordeaux*, 236 (1897); G. de Mortillet, *REA*, viii, 20–27 (1898).

**Culture Sequence:**

7. Proto-Solutrean, stone industry characterized by pedunculate points similar to those from Font-Robert, Spy, and Pont-à-Lesse
6. Upper Aurignacian
5. Upper Aurignacian
4. Upper Aurignacian
3. Aurignacian, imitation *Cypraea* carved from ivory
2. Aurignacian
1. Mousterian

The cave was almost completely filled by deposits having a total thickness of 4.5 m. (14.8 ft.). Horizons 4, 5, and 6 are scarcely separable, but all belong to the close of the Aurignacian. The mural engravings belong to the Middle Aurignacian (see Fig. 114); at least fourteen of them are determinable. Among the faunal remains, those of the bison predominate. The collections are in the private museum of François Daleau at Bourg-sur-Gironde.

### Papeterie, La (Charente)

Cave in the commune of Puymoyen.
Explored by Chauvet.

**References:** Chauvet, *BSAHC*, 7 pp. (Apr., 1907).

**Culture Sequence** (Chauvet):

2. Magdalenian
1. Mousterian, sling stones similar to those from La Quina

### **Pech de Bertrou** (Dordogne)

Station in the commune of Tayac, near La Mouthe.
Explored by D. Peyrony.

**References:** Peyrony, *AFAS*, ii, 901–903 (Angers, 1903).

**Stratigraphy** (Peyrony):

2. Neolithic
1. Chellean

### **Pech** (or **Pey**) **de l'Aze** (Dordogne)

Cave 5 km. from Sarlat.
Explored by Lartet and Christy, Peyrony.

**References:** Lartet and Christy, *R. Arch.*, ix, 236–237 (1864); Capitan and Peyrony, *REA*, xix, 402–404 (1909).

**Culture Sequence:**

Upper Mousterian, skull of child 5 or 6 years old
1. Mousterian, cleavers

### **Petit-Puymoyen, Le** (Charente)

Escarpment station and small rock shelter in the commune of Puymoyen, near the cave of Papeterie.
Explored by A. Favraud and A. Hurtel.

**References:** Favraud, *REA*, xviii, 46–66 (1908); Siffre, *ibid.*, 66–72 (1908).

**Culture Sequence:**

2. Upper Mousterian, bone compressors; human maxillaries
1. Lower Mousterian, breccia, cleavers.

Fauna: reindeer, horse, *Bos*, wolf, *Canis*, fox.

### **Pis de la Vache** (Lot)

Cave at the Château de la Forge near Souillac.
Explored by Rupin, Viré, Bouyssonie.

**Culture Sequence** (Viré):

2. Magdalenian, batons, bone needles
1. Mousterian

**Placard, Le** (formerly called **Rochebertier**) (Charente)

Cave near Rochebertier in the commune of Vilhonneur. (See Fig. 252.)
Explored by A. Fermond, A. de Maret, *et al.*

**References:** Fermond, *Mat.*, 2d ser., ix, 5 12 (1874); Bourgeois and Delaunay, *ibid.*, x, 191–192 (1875); de Maret, *CAF* (Vienne, 1879); de Maret, *Mat.*, xvi, 33–34 (1879); Chauvet, *BSAHC*, 248 (1896); A. de Mortillet, *CPF*, 241-267 (Vannes, 1906); Breuil and Obermaier, *Anthr.*, xx, 523–530 (1909).

**Culture Sequence** (Breuil):

8. Neolithic
7. Upper Magdalenian, (see Fig. 179)
6. Lower Magdalenian
5. Lower Magdalenian
4. Lower Magdalenian } (See Figs. 97, 175 and 253.)
3. Upper Solutrean
2. Lower Solutrean
1. Mousterian

Entire deposit some 8 m. (26.2 ft.) thick. Sterile layers alternate with culture deposits. Objects found at Placard include batons and fine flint points of Solutrean age; bone flutes found by Fermond, which resemble those of the Mandan Indians; a needlecase made of bird bone and filled with bone needles, discovered by de Maret. The principal collections from Placard are at Saint-Germain, Toronto, and Larochefoucauld (in the possession of Dr. l'Homme).

**Plage du Havre, La** (Seine-Inférieure)

Submarine station near the Boulevard Maritime and the Batterie des Huguenots.
Explored by Georges Romain.

**References:** Romain, *REA*, iv, 150–153 (1894); Rutot, *CPF*, 2d session, 61–66 (Vannes, 1906).

**Stratigraphy** (Romain):

5. Stony deposit
4. Yellow sand, numerous marine shells
3. Thin shelly deposit
2. Relatively thick sandy deposit, flint implements of Acheulian and Mousterian types at base
1. Yellowish clay, fossil remains including *Elephas primigenius*

### Planche-Torte (Corrèze)

Several caves in the valley of the Planche-Torte near Brive.
Explored by the Abbés L. Bardon, J. and A. Bouyssonie.

**References:** Bardon, J. and A. Bouyssonie, *REA*, xvi, 170–175, 401–411 (1906); *ibid.*, xvii, 120–144 (1907); *ibid*, xx, 28–40, 60–71 (1910); *ibid.*, xxx, 177–189 (1920); Breuil, *RP.*.iv, 33 (1909).

**Culture Sequence:**

I. Lacoste—six Aurignacian horizons
II. Pré-Aubert (called by Breuil, Lacoste II)
  4. Solutrean
  3. Solutrean
  2. Aurignacian
  1. Aurignacian
III. Combe à Negre
  2. Solutrean
  1. Aurignacian
IV. Grotte de Champs
V. Coumbâ-del-Bouïtou
  3. Neolithic, potsherds, stone mortar
  2. Aurignacian
  1. Aurignacian, Mousterian forms persisting (see Fig. 80)

In Nos. 1 and 2 flint implements to the number of 14,000 were found.

VI. Raysse
  1. Aurignacian
VII. Grotte des Morts
  1. Aurignacian, engraving of wild goat on bone; only cave in the valley, in which bones have been preserved
VIII. Grotte de Bellet
  1. Aurignacian, engraving of a hind on stone

### Planes, Les (Charente)

Sand pits in the lowest valley terrace (4th), commune of Saint-Yrieix, about 5 km. (3.1 mi.) from Angoulême.
Explored by V. Commont, Chauvet, *et al.*

**References:** Favraud, *BSAHC*, (1912).

**Stratigraphy:**

3. Aurignacian
2. Mousterian
1. Acheulian

**Plantade** (*see* **Bruniquel**)

**Poron des Cuèches, Le** (Côte d'Or)

Rock shelter near the summit of Nan-sous-Thil mountain.
Explored by Ch. Boyard.

**References:** Boyard, *AFAS*, 614–619 (Dijon, 1911); *ibid.*, 512–522 (Nîmes, 1912).

**Culture Sequence** (Boyard):

8. La Tène (Iron Age)
7. Robenhausian (Neolithic), traces of Hallstatt Epoch at top
6. Sterile deposit
5. Tardenoisian
4. Sterile deposit
3. Sandy deposit, bones of small rodents
2. Bone breccia
1. Magdalenian

**Pré-Aubert** (*see* **Planche-Torte**)

**Quina, La** (Charente)

Rock shelters and caves on the Voultron in the commune of Gardes, near Villebois-Lavalette. The south station is of Aurignacian age; the north station is the important one.

Explored by Chauvet in 1872; by Dr. Henri-Martin since 1905.

**References:** Chauvet, *BSAHC*, 303–336 (1896); A. de Mortillet, *HP*, iv, 231–238 (1906); Chauvet, *BSAHC*, 8 pp. (1907); Henri-Martin, *BSPF*, iii, 7 pp. (1906); Henri-Martin, Bourlon, and Giraux, *ibid.*, iv (1907); Henri-Martin, *Recherches sur l'evolution du Mousterien dans le gisement de La Quina (Charente)* (Paris, 1907); Henri-Martin, *Industrie osseuse*, i (1907–1910); Henri-Martin, *CPF*, 203–223 (Autun, 1908); Henri-Martin, *AFAS*, 727 730 (Clermond-Ferrand, 1908); *ibid.* (Lille, 1909); Henri-Martin, *BSPF*, vi, 303–310 (1909); *ibid.*, vii, 391–397 (1910); Henri-Martin, *AFAS* (Toulouse, 1910); Henri-Martin, *A S*, cliii, 728–730 (1911); Henri-Martin, clv, 982 983 (1912); Henri-Martin, *CPF*, 125–128 (Tours, 1911); Henri-Martin, *BSPF*, viii, 615–626 (1911); *ibid.*, ix, 389–424, 700–709 (1912); Henri-Martin, *AFAS* (Nîmes, 1912); Henri-Martin, *CPF*, 282–296 (Angoulême, 1913); Henri-Martin, *BSPF*, x, 86 89, 540–543 (1913); Henri-Martin, *Anthr.* (1921).

**Culture Sequence** (adapted from Henri-Martin):

5. Final Mousterian
4. Upper Mousterian (1) [5]
3. Upper Mousterian (2), cranium of eight-year-old child, (see Fig. 230)
2. Mousterian (3), clay, part of female skeleton, (see Figs. 228 and 229)
1. Mousterian (4), clay sands

The shelters and caves were eight or ten meters (26.3–32.8 ft.) above the Voultron, which once flowed at the base of the escarpment. Kitchen refuse was thrown over the escarpment and mingled with the talus as it formed. Martin's final Mousterian was left by an encampment on the talus.

Fauna: Bos, reindeer, horse abundant; hyena, *Bison*, lion, fox (rare), wolf, red deer, *Capridae*.

## Raymonden (Dordogne)

Rock shelter in the commune of Chancelade, 7 km. (4.4 mi.) northwest of Périgueux. (See Figs. 137 and 251.)

Explored by Hardy and Féaux.

**References:** Féaux, *Bull. Soc. arch. et hist. Périgord*, 42 (1875); Hardy, *ibid.*, 66 (1891); Testut, *Recherches anthr. sur le squelette Quatern. de Chancelade* (Dordogne) (Lyon, 1889); Breuil, *REA*, xv, 154–155 (1905).

**Culture Sequence:**

4. Magdalenian, many artifacts and fossil animal remains; loam with central hearth—0.55 m.
3. Magdalenian, grayish hearth rich in flint and bone implements—0.4 m.
2. Yellow earth—0.37 m.
1. Magdalenian, black, sandy hearth—0.37 m.

A human skeleton was found at the base of deposit No. 1. It is said by Hardy to have rested in a grave sunk from the level of deposit No. 3; this view is opposed by de Mortillet, who insists that there was no sepulture and that the skeleton is contemporaneous with the lowest deposit.

## Rebières, Les (Dordogne)

Rock shelters and a cave.

Explored by E. Pittard, Montandon.

**References:** Pittard, *REA*, xvii, 429–433 (1907); *ibid.*, 255–261 (1908); Pittard, *BMSA*, 5th ser., viii, 65–71 (1907); Pittard, *Bull. Soc. anthr.*,

[5] Numbers in parentheses are from Henri-Martin.

114–116 (Lyon, 1911); PITTARD, *CIA*, i, 363–405, 450–488 (Geneva, 1912); PITTARD, *Anthr.*, xxiii, 307–311 (1912).

**Culture Sequence:**

I. Les Rebières I
   1. Mousterian, groups of spheroidal stones resembling bolas

II. Grotte des Carnassiers
   3. Mousterian
   2. Sterile deposit
   1. Mousterian

III. Le Bonhomme
   2. Aurignacian
   1. Mousterian

IV. Les Rebières II (or Durand-Ruel)
   2. Upper Aurignacian
   1. Middle Aurignacian, engraved pebble

V. Recourbie
   1. Magdalenian

**Reilhac** (*see* **Roussignol**)

**Rey** (Dordogne)

Cavern 40 m. from Combarelles, in the valley of the Beune near Les Eyzies. (See Fig. 177.)

Explored by the Abbé Landesque and Rivière.

**References:** RIVIÈRE, *AFAS*, ii, 714–717 (Caen, 1874); *ibid.* (Lyon, 1906); PEYRONY, *BA*, 212–215 (1909); MACCURDY, *Amer. Anthr., N.S.*, xxv, 72–89 (1923).

**Culture Sequence** (Peyrony):

4. Post-Paleolithic
3. Solutrean
2. Aurignacian, bone points with cleft base
1. Mousterian

**Rideaux, Les** (*see* **Lespugue**)

**Rivière** (Landes)

Station on the north bank of the Adour, opposite the cave of Sordes. Explored by Dubalen.

**References:** DUBALEN, *BSPF*, viii, 638–641 (1911); BREUIL, *ibid.*, 665–668 (1911).

**Culture Sequence** (Breuil):

3. Magdalenian
2. Solutrean
1. Aurignacian

The collections from Rivière are at Mont-de-Marsan. The engravings on bone are declared by Breuil to be frauds.

### Roc, Le, or La Grotte du Roc (Charente)

Cave in the commune of Sers.
Explored by A. Favraud.

**References:** Favraud, *REA*, xviii, 407–423 (1908); Breuil, *RP*, iv, Nos. 8, 9, 1 p. (1909).

**Culture Sequence:**

2. Solutrean
1. Upper Aurignacian

### Roc de Combe-Capelle, Le (Dordogne)

Rock shelter near the station of Combe-Capelle, and 1,500 m. (0.9 mi.) from Terme Pialat.
Explored by Villeréal, Chastaing, Breuil, J. Bouyssonie.

**References:** Breuil, *RP*, iv, Nos. 8, 9, 5 pp. (1909).

**Culture Sequence** (Breuil):

5. Upper Solutrean
4. Middle Solutrean
3. Transition from Aurignacian to Proto-Solutrean
2. Upper Aurignacian
1. Middle Aurignacian

### Roc de Saint-Christophe, Le (Dordogne)

Rock shelter in the commune of Peyzac.
Explored by D. Peyrony.

**Culture Sequence** (Peyrony):

6. Merovingian
5. Gallo-Roman
4. Epoch of La Tène (Iron Age)
3. Bronze Age
2. Neolithic
1. Upper Aurignacian

### Roche-au-Loup, La (Yonne)

Cave 37 m. (121.5 ft.) above Merry-sur-Yonne; length, 40 m. (131.3 ft.), thickness of deposits, 5 m. (16.2 ft.).

Explored by the Abbés Parat and Breuil.

**References:** Parat, *CIA*, 63–78 (Paris, 1900); Breuil, *RA*, xxi, 68–70 (1911).

**Culture Sequence** (Parat, Breuil):

4. Neolithic
3. Magdalenian
2. Lower Aurignacian
1. Mousterian

### Rochebertier (*see* Placard)

### Roches, Les (Dordogne)

Rock shelters in the valley of Les Roches, commune of Sergeac.

Explored by Reverdit, Didon, Delage, Peyrony, Hauser, *et al.*

**References:** Reverdit, *Station des Roches, commune de Sergeac* (Toulouse, 1882); Didon, "L'abri Blanchard des Roches," *Bull. Soc. hist. arch. Périgord* (1911); Boule, *Anthr.*, xxv, 230 (1914).

**Culture Sequence** (Didon):

I. Blanchard, No. 1

5. Vegetal earth
4. Sterile deposit
3. Middle Aurignacian
2. Sterile deposit
1. Middle Aurignacian, batons; bone needles; bone compressors; ornaments of ivory, bone, reindeer horn, stone, shell, teeth, pitted stones; phallic emblem and representations of the vulva

**Culture Sequence** (Peyrony):

II. Blanchard, No. 2

3. Upper Aurignacian
2. Upper Mousterian
1. Middle Mousterian

**Culture Sequence** (Peyrony):

III. Castanet

3. Middle Aurignacian
2. Sterile deposit
1. Middle Aurignacian

IV. Delage, or Roches-de-Sergeac
  2. Magdalenian, batons, bone needles
  1. Upper Aurignacian, implements of gravette type
V. Assieur
  1. Upper Aurignacian
VI. Labatut
  5. Upper Aurignacian
  4. Sterile deposit
  3. Upper Aurignacian
  2. Sterile deposit
  1. Upper Aurignacian
VII. Landesque, or Souquette
  2. Upper Aurignacian
  1. Middle Aurignacian

### Rochette, La (Dordogne)

Large rock shelter in the commune of Saint-Léon-sur-Vézère.
Explored by O. Hauser, F. Wiegers, *et al.*

**References:** Hauser, *Le Périgord préh.*, 22 pp., 7 plans (Le Bugue, 1911).

**Culture Sequence** (Wiegers):

3. Aurignacian, part of human skeleton and eleven teeth belonging to three other individuals
2. Mousterian
1. Acheulian

### Roussignol, or Les Pouzats (Lot)

Cave on the property of Mons. Roussignol at Reilhac, 10 km. (6.25 mi.) from the railway station of Gramat.
Explored by Bergougnoux; Cartailhac and Boule.

**References:** Bergougnoux, *Les temps préhs. en Quercy*[6] (Cahours, 1887); Cartailhac and Boule, *La Grotte de Reilhac, Causses du Lot*, 69 pp. (Lyon, 1889).

**Culture Sequence** (G. de Mortillet):

5. Robenhausian, flint saw with notched ends, polished stone axes, staghorn socket, potsherds
4. Azilian, harpoons
3. Magdalenian
2. Solutrean
1. Mousterian

[6] Quercy is approximately the equivalent of Lot and Tarn-et-Garonne.

The cave was practically emptied of its contents by the proprietor before it came to the attention of archeologists. Among the Paleolithic objects discovered were a sculptured reindeer horn with perforation and suggestion of an eye and mouth at one end; baton of reindeer horn; harpoons of reindeer horn; engraved bone, Solutrean and Mousterian flint implements.

### Ruth, Le (Dordogne)

Rock shelter near Le Moustier. Total thickness of deposits, 5.35 m. Explored by Robert Pagès and D. Peyrony.

**References:** Peyrony, *REA*, xix, 156–176 (1909); Breuil, *RP*, iv, Nos. 8, 9 (1909).

**Culture Sequence** (Breuil):

10. Humus
9. Lower Magdalenian
8. Sterile deposit
7. Upper Solutrean, points with lateral notch at base, hearth
6. Middle Solutrean, laurel-leaf points, hearths
5. Lower Solutrean
4. Nearly sterile deposit
3. Upper Aurignacian, gravette blades
2. Sterile deposit
1. Middle Aurignacian

### Saint-Acheul (*see* Amiens)

### Saint-Just-des-Marais (Oise)

Rebour sand pit 2 km. (1.25 mi.) from Beauvais.
Explored by L. Thiot.

**References:** Thiot, *BSPF*, i, 194–201 (June, 1904).

**Stratigraphy** (Thiot):

4. Neolithic
3. Magdalenian
2. Mousterian
1. Acheulian

### Saint-Marcel (Indre)

Rock shelter of La Garenne and caves of La Garenne on the right bank of the Creuse below Argenton. One cave at Saint-Marcel was destroyed in 1848 during the construction of the railway between Châteauroux and

Argenton; the contents, including many bones and chipped flints, were used as a filling for the roadbed.

Explored by M. Benoist in 1896.

**References:** Breuil, *Anthr.*, xiii, 145–165 (1902).

**Culture Sequence:**

I. Rock shelter
- 7. Talus
- 6. Magdalenian, yellow clay (continuation of No. 5); galloping reindeer engraved on schist
- 5. Magdalenian, traces of hearth; simple engravings, round-shafted harpoons
- 4. Magdalenian, brown clay; simple engravings
- 3. Magdalenian, broken bones; simple engravings at base of deposit
- 2. Magdalenian, hearth; engravings with contours cut away
- 1. Magdalenian, red deposit, hearth; bone pendants; engravings with contours cut away

II. Cave
- 4. Gallo-Roman
- 3. Neolithic
- 2. Yellow clay (within), probably Aurignacian and Magdalenian, bone needle, pointed implements, ivory spatula
- 1. Yellow clay near entrance, probably Mousterian

The Benoist collections are now at the National Museum of Antiquities at Saint-Germain.

## Saint-Prest (Eure-et-Loir)

Sand and gravel pit in the valley of the Eure near Chartres.

Explored by Desnoyers in 1863, the Abbé Bourgeois in 1867, *et al.*

**References:** Abbé Bourgeois, *AS*, lxiv, 47–48 (1867); A. Rutot, *La Préhistoire*, Part I (Brussels, 1918).

**Stratigraphy** (adapted from Rutot):
- 8. Brick earth
- 7. Recent loess
- 6. Loess (probably ancient)
- 5. Acheulian, flinty layer
- 4. Lower Quaternary
- 3. Pre-Chellean (*Reutelian* of Rutot), flinty layer
- 2. Upper Pliocene, fluvial sands; *Elephas meridionalis*
- 1. Eolithic (*Saint-Prestian* of Rutot), gravel bed

### Sergeac (*see* Les Roches)

### Solutré (Saône-et-Loire)

Two stations, Le Crot du Charnier and La Terre Sève, commune of Solutré, near Macon. Type station of the Solutrean Epoch (see Figs. 84–86.)

Explored by H. de Ferry and A. Arcelin. Abbé Ducrost, Capitan and Guillain.

**References:** DE FERRY, *R. Arch.*, xvii, 207–212 (1868); DE FERRY and ARCELIN, *Le Maconnais préh.* (Macon, 1870); ARCELIN and DUCROST, *BSA*, 486–489 (1876); DUCROST and LARTET, *Arch. Mus. hist. nat. de Lyon*, i, 1–36 (1872); BROCA, *BSA*, 2d ser., viii, 819–836 (1873); BROCA, *AFAS*, 651–662 (Lyon, 1873); ARCELIN, F. (with L. Mayet), *RA*, xxxiv, 38–66 (1924); HAMY, *BSA*, 2d ser., viii, 842–850 (1873); ARCELIN, *Anthr.*, i, 295 (1890); CAPITAN, *REA*, ix, 23 (1899); BREUIL, *RP*, ii, Nos. 6, 7 (1907); *ibid.*, iv, Nos. 8, 9 (1909); F. ARCELIN, *Assoc. régionale pour le dévelop. des recherches de paléontol. humaine et de préh.*, Bull. No. 1, 1–16 (Lyon, 1923).

**Culture Sequence:**

I. Crot du Charnier
- 6. Magdalenian
- 5. Solutrean
- 4. Solutrean
- 3. Upper Aurignacian, magma of horse bones (*Equus przewalskii*)
- 2. Aurignacian, hearths
- 1. Aurignacian, hearths

II. Terre Sève
- 4. Vegetal earth
- 3. Horse bones
- 2. Magdalenian, quantities of flint implements
- 1. Solutrean

### Sordes (Landes)

I. Rock shelter of Dufaure between Sordes and Cassabée.

Explored by H. Breuil, P. Dubalen, J. de Laporterie.

**References:** BREUIL and DUBALEN, *REA*, xi, 251–268 (1901).

**Culture Sequence** (Breuil):
- 3. Azilian, flat harpoon of staghorn
- 2. Magdalenian, two engravings on stone
- 1. Magdalenian, harpoons with two rows of lateral barbs

II. Cave of Duruthy; also caves of Le Grand Pastou and Le Petit Pastou. Explored by Pottier, L. Lartet, Chaplain-Duparc.

**References:** Lartet and Chaplain-Duparc, *Mat.*, 2d ser., ix, 101–167 (1874); Lartet and Chaplain-Duparc, *CIA*, i, 302–310 (Stockholm, 1874) Lartet and Chaplain-Duparc, *BSA*, 2d ser., ix, 516–525 (1874); Hamy, *ibid.*, 525–531.

**Culture Sequence:**

4. Neolithic, some 33 human skeletons of a type similar to the Cro-Magnon race, including a trephined skull
3. Magdalenian, brown hearth
2. Magdalenian, black hearth
1. Magdalenian

In the Magdalenian deposits, Lartet and Chaplain-Duparc found a human skull and part of the skeleton; also about fifty canines, three of *Felis*, the remainder of *Ursus ferox*, nearly all of which were perforated and decorated with incised designs, geometric for the most part, but including a realistic figure of a fish and one of a seal.

### Soucy (Dordogne)

Rock shelter near Lalinde.
Explored by Delugin, Soulas, Tarel.

**References:** G. de Mortillet, *L'homme*, ii, 731 (1885); Tarel, *HP*, x, 129–139 (1912); *CFG*, 177

**Culture Sequence:**

6. Talus
5. Upper Magdalenian
4. Sterile layer
3. Upper Magdalenian
2. Sterile layer
1. Upper Magdalenian

### Sous-Sac (Ain)

Rock shelters in the commune of Craz.
Explored by the Abbé Tournier and Ch. Guillon.

**References:** Tournier and Guillon, *Les abris de Sous-Sac et les grottes de l'Ain à l'époque néolithique* (Bourg, 1903).

**Culture Sequence:**

4. Vegetal earth
3. Neolithic, pottery
2. Neolithic, hearth
1. Late Magdalenian or Azilian, sandy tuff; human sepulture

### **Spugo** (Haute-Garonne)

A group of caves at Ganties-les-Bains, near the château of Montespan and not far from Saint-Martory.

Explored by Marcel Basset and Jean Cazedessus in 1921 and 1922.

**References:** Cazedessus, *Gisements préhistoriques de la Spugo de Ganties les-Bains, Hte.-Garonne* (Saint-Gaudens, 1923).

**Culture Sequence:**

3. Iron Age (Epoch of La Tène).
2. Neolithic, perfect pottery vessel
1. Magdalenian, engravings, bone needles, batons, etc.

### **Tabaterie** (Dordogne)

Station in the commune of Boulouneix, near Brantôme.

Explored by Capitan, Peyrony, and Bourrinet.

**Culture Sequence:**

5. Aurignacian
4. Aurignacian
3. Mousterian
2. Mousterian, cleavers
1. Mousterian

### **Teyjat** (Dordogne)

I. Cavern of La Mairie, (see Figs. 95 and 131).

Explored by Perrier du Carne, Capitan, Breuil, Bourrinet, Peyrony.

**References:** Perrier du Carne, *La grotte de Teyjat, gravures magdaleniennes* (Paris, 1889); Capitan, Breuil, and Peyrony, *REA*, xiii, 364–367 (1903); Capitan, Breuil, Peyrony, and Bourrinet, *ibid.*, xviii, 153–173, 198–218 (1908); *ibid.*, xix, 62–76 (1909); Capitan, Breuil, Peyrony, and Bourrinet, *CIA*, i, 498–514 (Geneva, 1912).

**Culture Sequence** (Breuil):

4. Sterile deposit
3. Upper Magdalenian, harpoons with two rows of lateral barbs
2. Sterile deposit
1. Lower Magdalenian

Engravings on the blocks of stalagmite belong to the Middle Magdalenian (see Fig. 120).

II. Rock shelter of Mège, discovered in 1903 by Bourrinet.

Explored by Bourrinet, Capitan, Breuil, Peyrony.

**References:** Capitan, Breuil, Bourrinet, and Peyrony, *REA*, xvi 196–212 (1906); *ibid.*, xix, 62–76 (1909).

**Culture Sequence** (Breuil):

2. Several sterile layers
1. Middle Magdalenian, baton of staghorn with remarkable engravings, including figure of horse and manikins wearing chamois-head masks (see Fig. 167)

### Tilloux (Charente)

Station in a Quaternary alluvial deposit near Gensac-la-Pallue, south Bourg-Charente and not far from Jarnac.

Explored by M. Boule and G. Chauvet.

**References:** Chauvet, *BSAHC* (July 16, 1895); Boule, *Anthr.*, vi, 497–509 (1895); Capitan, *REA*, v, 380–388 (1895)

**Stratigraphy** (Capitan):

3. Neolithic
2. Acheulian
1. Chellean

Boule insists that the Paleolithic deposits can not be separated into two horizons since Chellean and Acheulian types and associated fauna (*Elephas meridionalis*, *E. antiquus*, and *E. primigenius*) occur together.

### Tourasse, La (Haute-Garonne)

Cave near Saint-Martory.

Explored by L. Darbas and Chamaison.

**References:** Harlé, *Anthr.*, v, 402–406 (1894); Cartailhac, *ibid.*, vii, 312–316 (1896); G. and A. de Mortillet, *Préh.*, 238.

**Culture Sequence:**

2. Neolithic, human skeletons; human vertebra pierced by a flint arrowhead
1. Azilian, painted pebbles

De Mortillet chose La Tourasse as the type station for the epoch following the Magdalenian (*Tourassian*), but practically all other authors have accepted Piette's term "Azilian" instead.

### Trilobite, Le (*see* Arcy-sur-Cure)

### Trois-Frères (Ariège)

Cavern in the commune of Montesquieu-Avantes, discovered in July, 1914, by Count Begouen and his three sons, hence the name. The dis-

covery was by means of a pit from the top; the adjacent cave of Enlène is now used as the entrance.

Explored by Count Begouen and his sons.

**References:** Begouen, *AIB*, 303–310 (1920).

**Culture Sequence:**

2. Magdalenian
1. Aurignacian

There are some four hundred mural engravings, two of which are partly outlined in black (the sorcerer and a lion); portable art objects, batons, bone needles (see Fig. 151).

### **Tuc d'Audoubert** (Ariège)

Cavern in the commune of Montesquieu-Avantes, discovered in July, 1912, by Count Begouen and his sons (see Figs. 145 and 146).

Explored by Count Begouen and his sons.

**References:** Begouen, *CIA*, i. 489–497 (Geneva, 1912); Begouen, *Anthr.*, xxiii, 657–665 (1912).

**Culture Sequence:**

2. Magdalenian
1. Aurignacian

Bisons modeled in clay (see Fig. 148), mural engravings (see Figs. 147 and 181), signs in color, claviform figures, portable art objects including horse and Cervidae with contours cut away. In some engravings the animals' breath is represented by incised lines. Point with cleft base and its bone shaft some 15 cm. (5.9 in.) long, batons.

### **Vache, La** (Ariège)

Cave on the left bank of the Vic-de-Sos, opposite Niaux, commune of Alliat.

Explored chiefly by Garrigou.

**References:** Garrigou, *Grotte de la Vache* (1867).

**Culture Sequence:**

2. Azilian, harpoons of staghorn
1. Magdalenian, harpoons of reindeer horn, engravings on bone

There are a few mural paintings. The Garrigou collections are in Foix.

### Vachons, Les (Charente)

Two rock shelters and a cave in the commune of Voulgézac; the site was formerly known as Dallignac.

Explored by J. Coiffard.

**References:** Coiffard, *AFAS*, 623–627 (Havre, 1914).

**Culture Sequence** (Coiffard):

I. Rock shelters
- 4. Final Aurignacian
- 3. Upper Aurignacian
- 2. Upper Aurignacian
- 1. Lower Aurignacian

II. Cave
- 1. Solutrean

### Villefranche-sur-Saône (Rhône)

Station on the right bank of the Rhône at Le Garret.

Explored by the Abbé J. M. Beroud.

**References:** Cl. Savoye, *Le Beaujolais préhistorique*, 36 (1899); Beroud, *CPF*, ix, 101–113 (Lons-le-Saunier, 1913).

**Stratigraphy** (composite section):

5. Wash
4. Solutrean, blue marl
3. Gravel, mammoth
2. Warm Mousterian, *Rhinoceros merckii*
1. Clay of Saint-Côme (equivalent of Cromer Forest Bed)

## GERMANY

### Andernach (Rhine)

Loess station in Martinsberg, near Andernach on the Rhine.

Explored by Koenen and H. Schaaffhausen.

**References:** Schaaffhausen, *Verh. d. natur. hist. Verein*, 39, 63 (Bonn, 1883); Wiegers, *PZ*, i, 18 (1909); *DVD*, 88–90, 205–206.

**Stratigraphy** (Schmidt):

2. Upper Magdalenian (see Fig. 176)
1. Middle Magdalenian

### Bockstein (Württemberg)

Cave near Langenau.
Explored by the Ulmer hist. Verein and R. R. Schmidt.

**References:** Fraas, *KB*, 9–12 (1884); M. Hoernes, *DME;* Obermaier, *Anthr.*, xvii, 61–62 (1906); *DVD*, 44–46, 173, 174.

**Culture Sequence** (Schmidt):

3. Upper Magdalenian
2. Upper Aurignacian
1. Early and Middle Aurignacian

### Buchenloch (Rhine)

Cave on the Monterlei, near Gerolstein.
Explored by E. Bracht in 1879.

**References:** Schaaffhausen, *KB*, 108–113 (1883); E. Bracht, *Festschr. z. 14ten anthr. Versamm. in Trier* (1883); *DVD*, 76–77, 208.

**Culture Sequence** (Schmidt):

3. Lower Magdalenian
2. Lower Aurignacian
1. Lower Mousterian

### Ehringsdorf (*see* Taubach-Ehringsdorf)

### Hohlefels (Württemberg)

Caves at Schelklingen and Hütten.
Explored by O. Fraas and J. Hartmann in 1870–71 (Schelklingen); R. R. Schmidt (Hütten).

**References:** Duhousset, *BSA*, 2d ser., vi, 317–318 (1871); Fraas, *AA*, v, 132, 173–213 (1872); *DVD*, 51–52, 174.

**Culture Sequence** (Schmidt):

I. Schelklingen
   3. Upper Magdalenian
   2. Middle Magdalenian
   1. Upper Aurignacian (?)

II. Hütten
   2. Upper Magdalenian
   1. Middle Magdalenian

Collections from Hohlefels bei Hütten are at the University of Tübingen.

### Hundisburg (Saxony)

Station in the open at Neuhaldensleben, near Magdeburg.
Explored by F. Wiegers.

**References:** Wiegers, *ZE*, xxxvii, 915–920 (1905); *ibid.*, xxxix, 718–729 (1907); Wiegers, *PZ*, i, 3–6 (1909).

**Stratigraphy** (Wiegers):

10. Sandy loess, Würm
9. Sandy humus, Würm
8. Upper boulder clay (*Geschiebemergel*), Riss
7. Sandy marl (*Mergelsande*), Riss
6. Acheulian, coarse gravels, Mindel-Riss; **flint artifacts**; fine cleaver found in 1922; bones, shells
5. Fine sandy clay, Mindel-Riss
4. Sand with gravel banks (probably Acheulian); flint implements; Mindel-Riss
3. Yellow sandy marl, Mindel
2. Lower boulder clay, Mindel
1. Tertiary clay

### Kartstein (Rhine)

Two caves at Eiserfey near Mechernich.
Explored by C. Rademacher.

**References:** Rademacher, *PZ*, iii, 201–232 (1911); ***DVD*, 75–76,** 207–208.

**Culture Sequence** (Rademacher):

**I.** Large cave
7. Recent
6. Roman
5. La Tène
4. Magdalenian
3. Aurignacian, stone seats about a hearth
2. Upper Mousterian
1. Lower Mousterian

**II.** East entrance
6. Neolithic
5. Magdalenian
4. Aurignacian
3. Upper Mousterian
2. Lower Mousterian
1. Acheulian

The collections from Kartstein are in the prehistoric museum at Cologne

### **Kastlhäng** (Bavaria)

Cavern in the Altmühl valley near Neu-Essing, some 10 km. (6.25 mi.) above Kelheim.

Explored by J. Fraunholz and H. Obermaier from 1893–1907.

**References:** Fraunholz, Obermaier, and Schlosser, *BAUB*, xviii, 119–164 (1911); *DVD*, 52–54, 178.

**Culture Sequence:**

7. Bronze Age
6. Neolithic
5. Sterile layer
4. Rodent fauna
3. Middle Magdalenian
2. Cave-bear fauna
1. Cave-bear fauna

### **Klause** (Bavaria)

A group of caves four stories high, near Neu Essing, on the right bank of the Altmühl, a tributary of the Danube.

Explored by J. Fraunholz (who discovered them in 1903), Obermaier, Birkner, Wernert.

**References:** Obermaier, *Anthr.*, xxv, 254–262 (1914).

**Culture Sequence:**

I. Cave No. 1, at the top is a series of alcoves separated by rock prominences.

5. Neolithic
4. Upper Magdalenian, flint implements, numerous bone implements, bone needles, needlecases of bird bone, javelin points of reindeer horn with single or double bevel at the base, three batons of reindeer horn, harpoons with unilateral barbs, wands and pendants of ivory, perforated teeth; one of the most remarkable discoveries was a number of stone plaques (lithographic), colored somewhat after the manner of the painted pebbles from Mas d'Azil; reindeer fauna
3. Lower Magdalenian, numerous flint implements; awls and javelin points of bone; bone needles; perforated teeth; ivory pendant; many reindeer bones
2. Solutrean, laurel-leaf points, perforated teeth, engravings of mammoth on ivory; bones of the horse abound
1. Mousterian, flint implements; cave bear

II. Cave No. 2 is comparatively large but low and dark. The principal discovery was a human sepulture probably of Solutrean age; the skeleton was completely surrounded by a large mass of powdered ocher. Several art objects were found. In one corner were a series of broken plaques of lithographic stone (calcareous); on one of these the head and shoulders of a horse were engraved in fine lines. Although the stratigraphy is somewhat mixed, the following epochs are represented:

6. Neolithic
5. Upper Magdalenian
4. Lower Magdalenian mixed; bone points, a needle, two javelin points with double bevel at base, a harpoon with unilateral barbs, several perforated teeth
3. Solutrean, laurel-leaf points; human skeleton
2. Mousterian, implements of poor quality of flint, including two cleavers
1. Acheulian, numerous flint implements; a human tooth

III. Cave No. 3, referred to as the Acheulian rock shelter, is small and was in part emptied of its contents a dozen years before being explored by Obermaier, *et al.* Enough remained, however, to prove that the shelter had been occupied at various epochs from the Acheulian to and including the Neolithic. At the bottom was a virgin deposit containing a large quantity of Acheulian flint implements and many bones of the mammoth, rhinoceros, horse, etc.

IV. Cave No. 4 was emptied of its contents more than a half century ago and transformed into a cellar. Whatever of archeological remains it may have contained have been lost to science.

## **Markkleeberg** (Leipzig)

Sand and gravel pit near the city of Leipzig.
Explored by K. H. Jacob.

**References:** Jacob. *PZ*, iii, 116–122 (1911); Jacob, v, 331–339 (1913); Werth, *ZE*, xlvii, 234–241 (1915); *ibid.*, xlix, 54 (1917); F. Wiegers, *Diluvial prähistorie als geologische Wissenschaft*, 110–114 (Berlin, 1920).

**Stratigraphy** (Jacob):

3. Upper Mousterian
2. Mousterian
1. Acheulian

Wiegers holds that Jacob's stratigraphy is based on typology rather than on geology. The principal collections are in the possession of Felix and Weule, Leipzig.

### **Munzingen** (Baden)

Loess (recent) station near Freiburg on the Tuniberg, in Breisgau.
Explored by G. Steinmann, F. Graeff, and Otto Schoetensack.

**References:** Ecker, *AA*, viii, 87–101 (1875); Schoetensack, *ibid.*, N.F., i, 69–77 (1903); *MV*, 274, 327.

**Stratigraphy:**

3. Neolithic, pottery—2.20 m.
2. Sterile layer of loess—1.80 m.
1. Lower Magdalenian, implements of jasper, bone, and horn; fragments of a baton—0.30 m.

### **Ofnet** (Bavaria)

Two caves near the Württemberg border between Holheim and Utzmemmingen.
Explored by R. R. Schmidt.

**References:** Fraas, *KB*, 57 (1876); *ibid.*, 33 (1886); Ranke, *BAUB*, 108 (1879); *ibid.*, 46 (1880); Obermaier, *Anthr.*, xvii, 60–61 (1906); Breuil, *ibid.*, xx, 207–214 (1909); *DVD*, 33–43, 172–173.

**Culture Sequence** (Schmidt):

I. Grosse Ofnet (see Fig. 408)
10. Middle Ages
9. La Tène
8. Hallstatt
7. Late Bronze Age
6. Neolithic
5. Azilian-Tardenosian, sepultures (see Fig. 409)
4. Upper Magdalenian, fauna of lemming
3. Early Solutrean
2. Upper Aurignacian
1. Lower Aurignacian, fauna of lemming

II. Kleine Ofnet: same as for Grosse Ofnet except that horizons 5, 7, and 8 are lacking.

Collections from Ofnet are in the Urgeschichtliches Forschungsinstitut, Tübingen.

### **Propstfels** (Hohenzollern)

Cave near Beuron.
Explored by R. R. Schmidt.

**References:** R. R. Schmidt, *KB*, 75 (1908); *DVD*, 56–58, 177–178.

**Culture Sequence** (Schmidt):

8. La Tène
7. Bronze Age
6. Sterile deposit
5. Upper Magdalenian
4. Sterile deposit
3. Upper Magdalenian
2. Upper Magdalenian
1. Sterile deposit

### Räuberhöhle (Bavaria)

Cave at Etterzhausen in the Bavarian Oberpfalz.
Explored by O. Fraas, K. von Zittel, and F. von Gümbel in 1869–70.

**References:** Virchow, *VBGA*, 5–7 (1871); Zittel, *AA*, v, 325–345 (1872); *DVD*, 32, 171.

**Culture Sequence** (Schmidt):

3. Post-Paleolithic, pottery
2. Aurignacian
1. Upper Mousterian

Collections from the Räuber cave are at Freiburg, Ratisbon, Munich, Stuttgart, and London (British Museum).

### Rosenstein (Württemberg)

Cave near Heubach (Schwäbische Alb).
Explored by R. R. Schmidt.

**Culture Sequence** (Schmidt):

2. Magdalenian
1. Aurignacian

### Schussenquelle (Württemberg)

Station in the open, 2 km. (1.25 mi.) from Schussenried.
Explored by O. Fraas, who discovered it in 1865.

**References:** Fraas, *Staatsanzeiger für Württemberg*, 249–250 (1867); R. R. Schmidt, *KB*, xli, 113–115 (1910); *DVD*, 54–56, 187–188.

**Stratigraphy** (adapted from Fraas):

6. Deposit of decayed brownish-yellow moss (*Hypnum sarmentosum*); fossil animal remains—1.68 m.
5. Tufa (no moss), snails (*Helix pulchella*, *H. hispida* *Pupa muscorum*)—1.12 m.

4. Peaty moss deposit—0.84 m.
3. Middle Magdalenian, implements chiefly of flint and reindeer horn; engraved baton—1.12 m.
2. Moss deposit (*Hypnum grönlandicum* dominant)
1. Magdalenian, floor of black humus; numerous artifacts—1.12 m.

The principal collection is in Stuttgart.

### Sirgenstein (Württemberg)

Cavern between Schelklingen and Blaubeuren.
Explored by R. R. Schmidt.

**References:** R. R. Schmidt, *Der Sirgenstein und die diluvialen Kulturstatten Württembergs*, 47 pp. (Stuttgart, 1910); *DVD*, 18–31, 165–171.

**Culture Sequence** (Schmidt):

12. Middle Ages
11. Iron Age
10. Bronze Age
9. Upper Magdalenian, *Lagomys pusillus*
8. Lower Magdalenian, *Myodes torquatus*
7. Solutrean (transition)
6. Upper Aurignacian
5. Middle Aurignacian
4. Lower Aurignacian
3. *Myodes obensis* horizon
2. Upper Mousterian, bone compressors
1. Primitive Mousterian

The Sirgenstein collection belongs to the Urgeschichtliches Forschungsinstitut, Tübingen.

### Taubach-Ehringsdorf (Saxe-Weimar)

Three stations in the Ilm valley deposits: one near Weimar, one at the hamlet of Taubach, and one at Ehringsdorf.

Explored by A. Portis, G. Eichhorn, A. Goetze, H. Hahne, A Möller, H. Pohlig, M. Verworn, A. Weiss, E. Wust.

**References:** Goetze, *ZE*, xxiv, 366–377 (*VBGA*) (1892); Schoetensack, *ibid.*, 92–95 (1895); Nehring, *ibid.*, 338–340, 573–577 (*VBGA*) (1895); Lissauer, *ibid.*, xxxiv, 279–293 (*VBGA*) (1902); Schwalbe, *Anat. Anzeiger*, xlvii, 337–345 (1914); Virchow, *ZE*, xlvi, 869–879 (1914); *ibid.*, xlvii, 444–449 (1915); Werth, *ibid.*, xlviii, 119–131 (1916); Pfeiffer, *ibid.*, xlix, 65–85 (1917); H. Virchow, *Die menschliche Skeletreste aus dem Kämpfeschen Bruch im Travertin von Ehringsdorf bei Weimar* (Jena, Gustav Fisher, 1920).

**Stratigraphy of Ehringsdorf** (see Figs. 212 and 214):

5. Neolithic, humus
4. Upper travertine, very few stone implements; ashes; broken bones; temperate to cold fauna
3. Porous layer, no implements, only a few shells
2. Acheulian or ancient Mousterian, lower travertine; human lower jaws (see Figs. 213, 215 and 216)
1. Sands and gravels (Riss)

The stratigraphy of Taubach and Ehringsdorf are alike in so far as the two oldest deposits are concerned: (1) 1 to 2 m. (3.3 to 6.6 ft.) of glacial (Riss) gravels and sands with occasional boulders; (2) lower travertine, a lacustrine deposit, 4 to 8 m. (13.1 to 26.2 ft.) thick, in the lower portion of which are remains of a cold fauna including mammoth and woolly rhinoceros; in its upper part, a warm fauna including *Elephas antiquus*, *Equus*, *Rhinoceros merckii*, shells, and plant remains; also the human lower jaws.

At Taubach the culture-bearing portion of the lower travertine is at its base, and is thought by Obermaier to be of Chellean age; in the lower travertine at Ehringsdorf, the technique of chipping is Acheulian, but the forms are largely Mousterian. Above the lower travertine at Ehringsdorf comes the so-called "Pariser" (porous) loess, 1 m. (3.3 ft.) thick, representing a steppe climate; and finally a thick deposit of upper travertine with remains not only of a forest fauna but also of the woolly rhinoceros and the southern rhinoceros (*Rhinoceros merckii*).

The principal stations are the Kämpfe (human lower jaws) and Fischer quarries at Ehringsdorf, and the Ulle quarry at Weimar. The industrial remains include Mousterian points and slug-shaped implements. A vessel made from the head of a femur of *Rhinoceros merckii*, found at Taubach, is now in the Römer Museum at Hildesheim.

## Weimar (*see* Taubach-Ehringsdorf)

## Wildhaus (Nassau)

Cave about 50 m. (164.2 ft.) from the Wildscheur cave, near Steeten an der Lahn.

Explored by Cohausen in 1874.

**References:** Cohausen, *Ann. d. Ver. f. Nass. Altertumskunde und Gesichtsforschung*, xiii, 379–389 (1874); R. R. Schmidt, *DVD*, 85.

**Culture Sequence** (Schmidt):

2. Lower Magdalenian
1. Upper Aurignacian

The Wildhaus collection is in the Landes Museum, Wiesbaden.

### **Wildscheuer** Nassau)

Cave at Steeten an der Lahn.

Explored as early as 1820; by Amann, 1842; Thoma; Cohausen, 1874; Behlen, 1905; R. R. Schmidt, 1908.

**References:** Cohausen, *ZE*, vi, 173–174 (*VBGA*) (1874); R. R. Schmidt, *KB*, xxxix, 77 (1908); *DVD*, 78–84, 208–209.

**Culture Sequence** (Schmidt):

7. La Tène
6. Bronze Age
5. Neolithic
4. Lower Magdalenian, rodent fauna
3. Upper Aurignacian
2. Middle Aurignacian
1. Rodent fauna

The principal Wildscheuer collections are in the Landes Museum at Wiesbaden, and in the Urgeschichtliches Forschungsinstitut at Tübingen.

## HUNGARY

### **Balla** (Bükk Mts.)

Cave near Répáshuta.

**References:** Hillebrand, *WPZ*, vi, 14–39 (1919).

**Culture Sequence** (Hillebrand):

3. Magdalenian, sepulture of a child
2. Solutrean
1. Proto-Solutrean or Aurignacian (?)

### **Cioclovina** (Transylvania)

Dr. Martin Roska found flints of incontestable Aurignacian type and some that seem to be of Mousterian age; cave bear remains were abundant in these layers.

### **Istalloskö** (Bükk Mts.)

Cave near Szilvasvarad.

**References:** Hillebrand, *WPZ*, vi, 14–39 (1919).

**Culture Sequence:**

1. Middle Aurignacian

**Jankovich or Jankovics** (Bükk Mts.)

Cave at Bajot on the right bank of the Danube near Esztergom.

**References:** Hillebrand, *WPZ*, vi, 14–39 (1919).

**Culture Sequence** (Hillebrand):

2. Magdalenian, bone needles
1. Solutrean, stylistic animal head (?) of stone; decorated amulet of ivory

**Kiskevély** (Budapest)

Cave on the left bank of the Danube.

**References:** Hillebrand, *WPZ*, vi, 14–39 (1919); Breuil, *Anthr.*, xxxiii, 323–346 (1923).

**Culture Sequence** (Breuil):

4. Magdalenian
3. Solutrean
2. Middle Aurignacian
1. Upper Mousterian

**Peskö** (Bükk Mts.)

Cave a few kilometers south of Istalloskö cave.

**Reference:** Breuil, *Anthr.*, xxxiii, 323–346 (1923).

**Culture Sequence** (Breuil):

2. Magdalenian
1. Aurignacian

**Puskaporos** (Bükk Mts.)

Cavern near the cavern of Szeleta.

**References:** Hillebrand, *WPZ*, vi, 14–39 (1919).

**Culture Sequence** (Hillebrand):

2. Magdalenian
1. Proto-Solutrean

**Szeleta** (Szinva Valley)

Cave near Miskolcz.
Explored by Dr. Kadič.

**References:** Otto Herman, *MAGW*, xxiii, 77–82 (1893); Herman, *ibid.*, xxxviii, 232–263 (1908).

**Culture Sequence** (Herman):

4. Neolithic and later—1.0 m.
3. Paleolithic, gray clay with bones of cave bear—2.0 m.
2. Paleolithic, red clay with bones of cave bear—2.0 m.
1. Paleolithic, brown clay with bones of cave bear—2.0 m.

Among the stone implements discovered, are cleavers of Mousterian type and laurel-leaf blades of Proto-Solutrean and Solutrean types.

## ITALY

### Bosco (Tiber valley)

Station in alluvial deposits.
Explored by G. Bellucci.

**References:** Bellucci, *AAE*, xliv, 289–324 (1914).

**Stratigraphy:**

3. Mousterian
2. Acheulian
1. Chellean

### Capri (Campania)

Loess station in the open, near the Certosa, island of Capri.
Explored by Bassani and Galdieri.

**References:** Mocchi, *CIA*, i, 259–260 (Geneva, 1912).

**Stratigraphy** (Mocchi):

2. Volcanic deposit
1. Chellean, cleavers, scrapers, knives, disks of flint and quartzite foreign to the island; interglacial fauna: *Elephas antiquus, Rhinoceros merckii, Hippopotamus amphibius, Ursus spelaeus, Cervus elaphus, Equus caballus*

Quaternary deposits rest on a raised beach at an elevation of 130 m. (426.8 ft.) above present sea level.

### Cucigliana (Tuscany)

Cave in the lower Arno valley at an altitude of some 50 m. (164 ft.) in the Pisano mountain.
Explored by Acconci and Incontri.

**References:** Mocchi, *CIA*, i, 264 (Geneva, 1912).

**Culture Sequence** (Mocchi):

4. Lower Magdalenian (?), *Equus caballus, Cervus elaphus, Bo primigenius;* depth of deposit—0.5–0.8 m.
3. Lower Aurignacian, same fauna as in No. 4.
2. Lower Aurignacian, same fauna; depth of deposits in Nos. 3 an 2—1.0–1.3 m.
1. Mousterian, *Elephas antiquus, Rhinoceros merckii, Ursus spelaeus Equus caballus*—1.0 m.

## Grimaldi (Liguria)

Series of caves also known as Baoussé-Roussé (Balzi-Rossi or Red Rock) in the commune of Ventimiglia, near Mentone.

Explored by A. Grand in 1845; F. Forel, E. Chantre, Moggridge i 1862; Rivière, Broca, Costa de Beauregard, Julien and Bonfils, Villeneuve Verneau, Boule.

**References:** Rivière, *Decouverte d'un squelette humain de l'époque paléo lithique dans les cavernes des Baoussé-Roussé dites Grottes de Mento* (Paris, Balliére et fils, 1873); *ibid., De l'antiquité de l'homme dans le Alpes-Maritimes* (Paris, Ballière et fils, 1887); Verneau, *Anthr.*, iii 513–540 (1892); *ibid.*, xiii, 561–585 (1902); Piette, *BMSA*, 5th ser. iii, 771–779 (1902); Boule and Verneau, *Anthr.*, xvii, 257–320 (1906) L. de Villeneuve, Boule, Verneau, and Cartailhac, *Les Grottes d Grimaldi* (Baoussé-Roussé), 2 vols. in 4to (Monaco, 1906); Boule de Villeneuve, Cartailhac, and Verneau, *CIA*, 57–86, 114, 13 (Monaco, 1906); Rutot, *BSBG*, xxi (1907).

I. Grotte des Enfants, so-called because of skeletons of two childre found there by E. Rivière.

**Culture Sequence:**

14. Magdalenian, or its equivalent in point of time
13. Aurignacian, skeletons of two children now in the Catholi Institute, Paris
12. Aurignacian, skeleton of female, type of Cro-Magnon, now i the Museum at Monaco
11. Aurignacian, hearths
10. Aurignacian, hearths
9. Aurignacian, hearths
8. Aurignacian, hearths
7. Aurignacian, hearths
6. Aurignacian, Cro-Magnon male skeleton (see Figs. 245 and 246) now in museum at Monaco
5. Aurignacian, two negroid skeletons (see Figs. 247 and 248), no in museum at Monaco

4. Aurignacian, hearths
3. Aurignacian, hearths
2. Remains of *Rhinoceros merckii*, cave lion
1. Mousterian, hearths; *Rhinoceros merckii*

All layers are of Quaternary Age; Nos. 1 and 2 contained *Rhinoceros merckii* but not *Elephas antiquus* or *Hippopotamus*, hence are not so old as the lowest layers at the Grotte du Prince. *Rhinoceros merckii* persisted longer in Europe than *E. antiquus* and *Hippopotamus*. Reindeer were found at No. 5 and between Nos. 12 and 13. Implements of quartzite and calcareous stone predominate in the lowest levels, flint in the upper levels. Implements were manufactured elsewhere and brought to the Grimaldi caves. The fossil animal remains and the industrial remains are preserved in the Musée Anthropologique, Monaco.

II. Lorenzi rock shelter.

III. Florestan cave, explored by Prince Florestan about 1845

IV. Grotte du Cavillon, or Barma dou Cavillou (patois for Grotte de la Cheville). The industrial remains include Mousterian and Aurignacian types. One sepulture (see Fig. 249), transferred to Museum d'Histoire Naturelle, Paris.

V. Grotte de la Barma Grande (or Abbo, from its owner).

Explored by M. Julien and M. Abbo.

The deposits were some 10 m. (32.8 ft.) thick. Near the top Julien found a human skeleton, probably of Magdalenian age, which is now in the museum at Mentone. At a level above midway, Abbo found a skeleton of a large Cro-Magnon male which has been left *in situ;* at a level below midway, a triple burial: a large Cro-Magnon male and two youths, one of which is probably a female. The large male was removed to a museum built near the entrance to the cave, the two youths were left *in situ*. A fourth skeleton, partially burned, which is now in the museum, is said to have been found near the second burial from the top.

The industrial remains include Mousterian and Aurignacian types, the latter largely of flint, the former of quartzite and calcareous stone. Bone compressors are included among the artifacts. The fauna includes *Elephas antiquus* and *Rhinoceros merckii* (see Figs. 109 and 163).

VI. Baousso da Torre.

Cave adjoining Barma Grande but at a lower level.

Explored by E. Rivière, later destroyed by quarrymen.

There were three sepultures, the skeletons from which were removed to the Museum d'Histoire Naturelle, Paris.

VII. Grotte du Prince, so called in honor of its owner, Prince Albert I of Monaco.

**Culture Sequence:**

9. Post-Pleistocene (?)
8. Hearths; cold fauna

7. Hearths; cold fauna, reindeer
6. Mousterian
5. Mousterian
4. Mousterian
3. Ancient Mousterian
2. Ancient Mousterian
1. Ancient Mousterian

The section from Nos. 1 to 9 has a thickness of 15 m. (49.2 ft.). Below this is a marine deposit 2 m. (6.6 ft.) thick. Between Nos. 1 and 2, 2 and 3, 3 and 4, are hearths with warm fauna: *Rhinoceros merckii, Elephas antiquus, Hippopotamus* (except between Nos. 3 and 4). There are relatively few scrapers; fusiform or slug-shaped implements pointed at both ends predominate. The collections are at the Musée Anthropologique, Monaco.

VIII. Unimportant rock shelter.

IX. Gerbai cave, unimportant.

### **Goti** (Apuan Alps)

Cave in the vicinity of Farnocchia.
Explored by Regnoli.

**References:** Mocchi, *CIA*, i, 272–273 (Geneva, 1912).

**Culture Sequence** (Mocchi):

2. Neolithic and later
1. Lower or Middle Aurignacian

### **Olmo** (Tuscany)

Station in the open near Arezzo, in the Arno valley above Florence.
Explored by Igino Cocchi in 1863; Forsyth-Major, *et al.*

**References:** Cocchi, *Mem. dell. Soc. Ital. de Sci. Nat.*, ii (Milan, 1867); G. de Mortillet, *BSA*, 2d ser., iii, 40–42 (1868); Hamy, *ibid.*, 112–118; Mocchi, *CIA*, i, 263 (Geneva, 1912).

**Stratigraphy** (Mocchi) (subject to revision):

2. Aurignacian, typical implement; *Megaceros;* gravels
1. Mousterian, flint implement; *Elephas antiquus, Equus caballus, Cervus elaphus, Bos primigenius, Bison priscus, Rhinoceros merckii;* blue clay in which celebrated Olmo human skull is said to have been found

### **Onda, all'** (Lucca Alpi)

Cave near Casoli.
Explored by Mocchi and Schiff-Georgini.

**References:** Mocchi and Schiff-Georgini, *AAE*, xlv, 89–119 (1915); Mocchi, *AAE*, l, 121–156 (1920).

**Culture Sequence** (adapted from Mocchi):

5. Eneolithic, recent faunal remains
4. Formation of stalagmite
3. Aurignacian, clay deposit with hearths; *Ursus spelaeus*
2. Formation of stalagmite
1. Mousterian (?), clay deposit with hearths; *Ursus spelaeus*, *Felis pardus*

### **Romanelli** (Otranto)

Cave near Castro, about 50 km. (31.25 mi.) south of Lecce.
Explored by P. E. Stasi and Baron G. A. Blanc.

**References:** Regalia *and* Stasi, *AAE*, xxxv, No. 2, second note (1905), G. A. Blanc, *ibid.*, l, 65–103 (1920).

**Culture Sequence:**

6. Upper Aurignacian, stalagmite; fauna including ass
5. Lower Aurignacian, red clay with fine eolian sand; *Elephas antiquus*, horse predominant
4. Stalagmite, temperate to cold fauna
3. Mousterian, stony layer composed largely of débris from ceiling: warm fauna
2. Atypic industry, hearths with warm fauna
1. Beach gravels

The cave of Romanelli is comparable with the Grimaldi caves. It is only 7.50 m. (24.6 ft.) above the sea; the station at Capri, also at a former beach level, is 130 m. (426.8 ft.) above the sea, but with the same warm fauna as that at the base of the deposits at Romanelli.

### **San Egidio** (Umbria)

Station in alluvial deposits in the valley of the Chiascio.
Explored by G. Bellucci.

**References:** Bellucci, *AAE*, viii, 41–49 (1878); *ibid.*, ix (1879); A. de Mortillet, *REA*, i, 321–341 (1891).

**Stratigraphy:**

3. Mousterian
2. Acheulian
1. Chellean

## JUGOSLAVIA

### Krapina (Croatia)

Rock shelter on the banks of the Krapinica, known since 1895. Explored by Karl Gorganovic-Kramberger from 1899–1905.

**References:** Kramberger, *MAGW*, xxxi, 164–197 (1901); Kramberger, *Der diluv. Mensch von Krapina in Kroatien*, xi+277 pp., 14 pls. (Wiesbaden, 1906); Kramberger, *Umschau*, xii (Aug. 8, 1908).

**Culture Sequence** (all eight levels are probably Mousterian):

9. *Ursus spelaeus*
8. Hearths
7. Hearths
6. Hearths
5. Hearths
4. Human bones
3. Human bones
2. Ossiferous zone, beaver
1. Pebbly layer

## MALTESE ISLANDS

### Ghar Dalam (Malta)

Cavern (Ghar) in the southeastern section of the island.

Explored by T. Ashby, Giuseppe Despott, and Zammit, under the auspices of the British Association in 1914 and 1917.

**References:** Arthur Keith, *Nature* (July 25, 1918); Despott, *JAI*, liii, 18–35, 4 pls. (1923).

**Culture Sequence:**

7. Bronze Age and later
6. Neolithic
5. Neolithic
4. Mousterian, chipped implements; human molar, remains of stag
3. Mousterian, human milk molar, remains of *Elephas*
2. Fauna of *Elephas*, *Hippopotamus*
1. Fauna of *Elephas*, *Hippopotamus*

## MONACO

### Observatoire, L' (Principality of Monaco)

Cave at considerable elevation in the city of Monaco.
Explored by the Abbé L. de Villenueve.

**Culture Sequence:**

4. Neolithic
3. Upper Paleolithic
2. Mousterian
1. Chellean

The cave is rich in fossil fauna including a large and rare species of *Canis*. The collections are in the Musée Anthropologique at Monaco.

## PHŒNICIA

### Adlun

Cave near a village of the same name about half way between Tyre and Sidon. Elevation, 150 m. (492.5 ft.).
Explored by G. Zumoffen.

**References:** Zumoffen, *Anthr.*, viii, 272–283, 426–438 (1897); Zumoffen, "*La Phénicie avant les Phéniciens. L'âge de la Pierre*" (Beyrouth, 1900).

**Culture Sequence:**

3. Mousterian
2. Acheulian
1. Chellean

### Antelias

Spacious cave in the Antelias valley some 8 or 10 km. northeast of Beyrouth.
Explored by G. Zumoffen.

**References:** Zumoffen, *Anthr.*, viii, 272–283, 426–438 (1897); Zumoffen, "*La Phénicie avant les Phéniciens. L'âge de la Pierre*" (Beyrouth, 1900).

**Culture Sequence:**

3. Magdalenian
2. Aurignacian
1. Mousterian

## POLAND

### Maszycka (Galicia)

Cavern on the left bank of the Pradnik in Ojcow ravine, village of Maszyce, near Krakau.

Explored by G. Ossowski.

**References:** Hoernes, *DME*, 175–178.

**Culture Sequence:**

2. Neolithic, four human skeletons
1. Magdalenian

### Nad-Galoska (Piotrokow)

Station in the district of Bedzin.

Explored by G. Ossowski.

**Culture Sequence** (Schmidt):

2. Aurignacian
1. Middle Mousterian

The collection is in the museum at Krakau.

### Wierzchow (Galicia)

Lower cavern known as the Cavern of the Mammoth, in the Rudava valley near Krakau.

Explored by Count J. Zavisza from 1873–1879; also by G. Ossowski.

**References:** Zavisza, *MSA*, 2d ser., i, 439–447 (1873); Zavisza, *CIA*, i, 69–75 (Stockholm, 1874); Zavisza, *L'homme*, 367 (1884); Zavisza, *ibid.*, ii, 156 (1886).

**Culture Sequence:**

5. Neolithic
4. Magdalenian (?)
3. Solutrean, laurel-leaf points
2. Aurignacian
1. Mousterian

Imitation teeth of ivory are said to have been found in the lower cavern at Wierzchow. The collections are in the museum at Krakau.

## PORTUGAL

### Furninha (Estremadura)

Cave in a cliff at a height of 15 m. (49.2 ft.) above sea level on the peninsula of Peniche, 60 km. (35 mi.) northwest of Lisbon.

Explored by Delgado.

**References:** Delgado, *CIA.*, 9th session, 207–278, 16 pls. (Lisbon, 1880).

**Culture Sequence:**

2. Neolithic, burials, pottery, stone implements, etc.
1. Paleolithic (probably Acheulian); seven fossil-bearing layers alternating with layers of sand

## RUSSIA

### Bologoie (Novgorod)

Loess station on a lake of the same name about midway between Petrograd and Moscow.

Explored by Prince Paul A. Poutiatine.

**References:** Rutot, *CPF*, vi, 227–233 (Tours, 1910)

**Stratigraphy** (Rutot):

5. Campignian and Age of Metals
4. Campignian and Age of Metals
3. Magdalenian
2. Lower Paleolithic
1. Lower Paleolithic

### Baratschwili (Caucasus)

Cave near Kutais.

Explored by R. R. Schmidt.

**References:** not yet published.[7]

**Culture Sequence** (Schmidt):

Several horizons of Upper Aurignacian

### Uwarof (Caucasus)

Cave near Kutais.

Explored by R. R. Schmidt.

**References:** not yet published.[7]

[7] Listed here by permission of Professor Schmidt.

**Culture Sequence** (Schmidt):

4. Middle Ages
3. Upper Aurignacian
2. Upper Aurignacian
1. Upper Aurignacian

### Virchow (Caucasus)

Cave near Kutais.
Explored by R. R. Schmidt.

**References:** not yet published.[8]

**Culture Sequence** (Schmidt):

4. Upper Aurignacian
3. Upper Aurignacian
2. Upper Aurignacian
1. Upper Aurignacian

Schmidt located a Paleolithic refuse heap in one of these horizons.

## SIBERIA

### Afontova Mountain (Yenisei Government)

Loess station near Krasnoyarsk.
Explored by I. T. Savenkov.

**References:** Savenkov, *Proc. East Siberian Sec. Russian Geogr. Soc.*, xvii, 3–4 (1886); Savenkov, *CIA*, i (Moscow, 1892); Baron de Baye, *Anthr.*, x, 172 (1899); G. von Merhart (trans. by G. G. MacCurdy), *Amer. Anthr.*, N.S., xxv, 1–55 (1923).

**Stratigraphy** (G. von Merhart):

4. Upper Paleolithic,[9] loess with various thin bands indicating culture remains
3. Upper Paleolithic, dark culture stains—0.15 m.
2. Fine sterile sand in lenticular masses—0.27–0 m.
1. Upper Paleolithic, sandy loess with scattering culture remains—0.55–0.40 m.

### Bateni (Yenisei Government)

Loess station on the left bank of the Yenisei, 265 km. (165.6 mi.) above Krasnoyarsk.

Explored by I. T. Savenkov, A. P. Jermolaev, G. von Merhart.

**References:** von Merhart, *Amer. Anthr.*, N.S., xxv, 1–55 (1923).

[8] Listed here by permission of Professor Schmidt.

[9] The horizons marked *Upper Paleolithic* in these Siberian stations are the equivalent of the Magdalenian, but with Siberian facies (persistence of Mousterian types).

**Stratigraphy** (G. von Merhart):

4. Iron Age, dark layer in blown sand—0.40 m.
3. Upper Paleolithic, at base of reddish-brown sandy loam—0.03 m.
2. Sand
1. Upper Paleolithic, resting on gravel and rubble

### Busunova (Yenisei Government)

Loess station north of Kosakenstaniza on the right bank of the Yenisei river, 350 km. (218.7 mi.) southwest of Krasnoyarsk.

Explored by G. von Merhart and G. P. Sosnovski in 1920.

**References:** VON MERHART, *Amer. Anthr.*, N.S., XXV, 1–55 (1923).

**Stratigraphy** (G. von Merhart):

7. Dune sand—1.00 m.
6. Iron Age, dune sand—1.00 m.
5. Structureless, fine gray sand—2.00 m.
4. Upper Paleolithic, yellow loess (no shells found)—3.00 m.
3. Upper Paleolithic, sandy loess with two relic-bearing horizons—1.00 m.
2. Stratified sands—4.00 m.
1. Rubble

### Lepjoschkina (Yenisei Government)

Loess station on the right bank of the Yenisei river some 265 km. (165.6 mi.) above Krasnoyarsk.

Explored by G. von Merhart and G. P. Sosnovski in 1920.

**References:** VON MERHART, *Amer. Anthr.*, N.S., XXV, 1–55 (1923).

**Stratigraphy** (G. von Merhart):

3. Iron Age camp site in fine sands
2. Upper Paleolithic, hearth and workshop at base of fine sands
1. Dark, stony deposit

### Peresselentscheskij Point (Yenisei Government)

Loess station across the Yenisei river (right bank) from Krasnoyarsk.

Explored by Baron de Baye, S. M. Sergejev, and A. N. Sobolev.

**References:** VON MERHART, *Amer. Anthr.*, N.S., XXV, 1–55 (1923).

**Stratigraphy** (G. von Merhart):

5. Dune sand
4. Iron Age—*ca.* 0.60 m.
3. Transition to fine sand—4.00 m.

2. Upper Paleolithic; in transition from sandy loess to yellow loess. *Succinea*—1.00 m.
1. Rubble—3.00–4.00 m

### Woennyi (Yenisei Government)

Loess station on the left bank of the Yenisei River northeast of Krasnoyarsk.

Explored by A. P. Jermolaev, A. I. Tugaranov, and G. von Merhart.

**References:** VON MERHART, *Amer. Anthr.*, N.S., XXV, 1–55 (1923).

**Stratigraphy** (G. von Merhart):

6. Late Iron Age camp site—*ca.* 0.50 m.
5. Loess
4. Upper Paleolithic, at a depth of 4.00 m. in loess
3. Sandy loess
2. Gravel and rubble
1. Paleozoic marl

## SPAIN

### Abrich Romaní (Barcelona)

Rock shelter at Capellades.

Explored by L. M. Vidal.

**References:** VIDAL, *Anuari de l'Institut d'Estudis Catalans*, Any, iv, 272–281 (1911–12).

**Culture Sequence** (Obermaier):

3. Neolithic
2. Magdalenian
1. Mousterian

The deposits are 12 m. (39.4 ft.) thick. Near by is the Mousterian station of Agut, also explored by Vidal.

### Altamira (Santander)

Grand cavern near Santillana del Mar.

Explored by Marcelino de Sautuola as early as 1875–79.

**References:** SAUTUOLA, *Breves apuntes sobre algunos objetos prehistoricos de la provincia de Santander* (Libreria Murillo, Madrid, 1880); CARTAILHAC, *Anthr.*, xiii, 348–354 (1902); *CA*, viii + 287 pp., 37 pls. (Monaco, 1906); *CRC*, 194–204, pls. xci–c.

**Culture Sequence** (Obermaier):

2. Magdalenian (see Fig. 112).
1. Upper Solutrean

The first Paleolithic mural paintings were discovered here by Sautuola in 1879 (see Figs. 7, 110 and 113).

### **Balzola** (Vizcaya)

Cave near Dima-Yurre.

Explored by A. de Galves-Cañero.

**References:** Obermaier, *HF*, 169, 319.

**Culture Sequence** (Obermaier):

2. Azilian
1. Magdalenian

### **Buxu, El** (Asturias) [10]

Cave in the district of Ganges de Onis.

Explored by C. Cardin, Francisco Benitez, H. Obermaier, and Count de la Vega del Sella.

**References:** Obermaier and Count de la Vega del Sella, *CIPP*, Mem. Num. 20, 42 pp. (Madrid, 1918).

**Culture Sequence** (based on mural art):

2. Middle Magdalenian
1. Lower Magdalenian

### **Cala, La** (Malaga)

Cave near the sea, between Malaga and Palo.

Explored by Miguel Such and H. Breuil.

**References:** Breuil, *Anthr.*, xxxi, 250–253 (1921).

**Culture Sequence:**

2. Neolithic, pottery
1. Late Paleolithic, or transitional (Tardenoisian)

### **Camargo,** or **Peña del Mazo** (Santander)

Cave at Revilla-Camargo.

Explored by Marcellino de Sautuola; J. Carballo and Lorenzo Sierra; H. Obermaier.

**References:** Obermaier, *MV*.

[10] The name of an ancient province which included what is now Oviedo and a part of Santander.

**Culture Sequence** (Obermaier):

3. Magdalenian, engravings
2. Solutrean
1. Aurignacian, human skull

### **Castillo** (Santander)

Cavern in the east side of Castillo mountain at Puente-Viesgo (see Figs. 5, 64, 112, 116, 142 and 169).

Explored by H. Alcalde del Rio; H. Obermaier and P. Wernert; H. Breuil.

**References:** *CRC*, 112–193, pls. lix–xc; Obermaier and Breuil, *CIA*, 361 (Geneva, 1912); Obermaier and Breuil, *Anthr.*, xxiii, 1–26 (1912); *ibid*, xxiv, 1–16 (1913); Obermaier, *HF*, 173–178.

**Culture Sequence:**

12. Eneolithic
11. Azilian
10. Upper Magdalenian
9. Lower Magdalenian
8. Lower Solutrean
7. Upper Aurignacian
6. Upper Aurignacian
5. Upper Aurignacian
4. Middle Aurignacian (or Lower)
3. Upper Mousterian
2. Upper Mousterian
1. Acheulian (or Lower Mousterian)

One of the thickest known series of superposed deposits; the thickness of the combined alternating sterile and relic-bearing deposits at the mouth of the cavern is 16 to 18 meters (52.5–59.1 ft.).

### **Cobalejos,** or **Puente-Arce** (Santander)

Cave at Puente-Arce, valley of Piélagos.

Explored by E. de la Pedraja; H. Obermaier and L. de Rozas.

**References:** Obermaier, *HF*, 179, 277

**Culture Sequence** (Obermaier):

3. Magdalenian
2. Solutrean
1. Mousterian

### Conde, El (Asturias)

Cave near Tuñon, district of Santo Adriano.
Explored by Count de la Vega del Sella, who discovered it in 1915.

**References:** Hernandez-Pacheco, *CIPP*, Mem. Num. 24, 27 pp. (1919).

**Culture Sequence:**

2. Aurignacian
1. Mousterian

### Cueto de la Mina (Asturias)

Cave near Posada.
Explored by Count de la Vega del Sella in 1914–15.

**References:** Count de la Vega del Sella, *CIPP*, Mem. Num. 13, 94 pp. (1916).

**Culture Sequence** (Count de la Vega del Sella and H. Obermaier):

8. Proto-Neolithic (Asturian and Azilian)
7. Upper Magdalenian
6. Upper Magdalenian
5. Lower Magdalenian
4. Upper Solutrean, laurel-leaf points, for the most part concave at the base
3. Lower Solutrean
2. Upper Aurignacian
1. Upper Aurignacian

### Fuente del Frances, La (Santander)

Cave near Hoznayo-Entrambasaguas.
Discovered in 1880 by E. de la Pedraja.

**References:** Obermaier, *HF*, 171.

**Culture Sequence** (Obermaier):

3. Magdalenian
2. Solutrean
1. Mousterian

### Hornos de la Peña (Santander)

Cave at San Felices de Buelna (see Fig. 174.)
Explored by L. Sierra, H. Alcalde del Rio, H. Obermaier, H. Breuil, J. Bouyssonie.

**References:** *CRC*, 85–111, pls. I–Ivііі; Breuil and Obermaier, *Anthr.*, xxiii, 1–26 (1912); Obermaier, *HF*, 138, 179–180, 231, 235, 248.

**Culture Sequence:**

4. Neolithic
3. Magdalenian
2. Lower Solutrean
1. Mousterian

## **Madrid** (Madrid)

Several diluvial stations near the city in the valley of the Manzanares, chiefly on the right bank. The best known is San Isidro in the village of the same name, across the river from Madrid (see Figs. 3 and 43).

Explored by Casiano de Prado as early as 1851 and 1862–64; by L. Lartet, G. de Mortillet, Cartailhac, J. Vilanova, L. Siret, Gaudry, M. Anton y Ferrandiz (San Isidro), H. Obermaier, P. Wernert, J. P. de Barradas, E. Hernandez-Pacheco.

**References:** Cartailhac, *Les âges prêhs. de l'Espagne et du Portugal*, 24–28 (Paris, 1886); de Baye, *BSA*, 4th ser., iv, 274–286, 391–402 (1893); Gaudry, *Anthr.*, v, 615–616 (1895); Obermaier, *HF*, 82–90, 192–194; Wernert and de Barradas, *Junta Sup. de Excavaciones y Antiguedades*, Num. Gral., 33 (Madrid, 1921).

**Stratigraphy:**

I. San Isidro
   4. Acheulian, sands with some clay, 7–8 m. (23–26.3 ft.).
   3. Lower Acheulian, sands and clays, 0.3–3.0 m., fossil fauna
   2. Chellean, cleavers somewhat waterworn; gravels, 3 m.; fossil fauna
   1. Middle Miocene, remains of *Anchitherium* and *Mastodon angustidens*

II. Lopez Cañamero
   1. Mousterian

III. Portazgo tile works (Wernert and de Barradas)
   11. Vegetal earth—0.25 m.
   10. Lower Magdalenian, red loam with gravels; *Equus*
   9. Clay and sand
   8. Lower Aurignacian, white earth—3.50 m.; *Equus*
   7. Upper fine sands—10–20 cm.
   6. Greenish earthy clay—0.50–1.0 cm.
   5. Mousterian, upper reddish sand and gravels—10–75 m.
   4. Basal earth—2.0 m.
   3. Mousterian, lower sands and gravels; *Equus*
   2. Acheulian, lower sands and gravels; *Equus*
   1. Chellean, lower sands and gravels; *Equus*

IV. Arenero del Portazgo sand pit (Wernert and de Barradas)
8. Vegetal earth—30 cm.
7. Earth with sand and gravels—80 cm.
6. Upper Mousterian, white earth
5. Reddish sands—50 cm.
4. Mousterian, greenish clay earth—0.50–1.20 m.; faunal remains
3. Mousterian
2. Acheulian, lower gravels; *Equus, Lepus*
1. Chellean

V. Las Carolinas tileworks
1. Early Aurignacian

VI. Pozos de Feito
1. Mousterian

VII. Casa del Moreno sand, gravel, and clay pit
2. Mousterian
1. Mousterian

**Morin** (Santander)

Cave some 15 km. (9.4 mi.) from the city of Santander.
Explored by Count Vega del Sella.

**Reference:** Vega del Sella, *CIPP*, Mem. No. 29, 166 pp., 85 text figs., 2 pls. (1921).

**Culture Sequence:**

7. Azilian (with harpoons)
6. Upper Magdalenian (with harpoons)
5. Upper Solutrean
4. Aurignacian
3. Aurignacian
2. Aurignacian
1. Mousterian

**Paloma, La** (Asturias)

Cave near Soto de las Regueras.
Explored by E. Hernandez-Pacheco in 1914–15; Count de la Vega del Sella, Juan Cabré, P. Wernert.

**References:** Obermaier, *HF*, 123, 187–188, 276, 320; Hernandez-Pacheco, *RA*, xxxii, 334–341 (1922); Hernandez-Pacheco, *CIPP*, Mem. No. 31, 38 pp. (1923).

**Culture Sequence** (Obermaier):

7. Age of Metals
6. Neolithic
5. Azilian
4. Sterile layer
3. Upper Magdalenian
2. Middle Magdalenian, batons, needles
1. Lower Magdalenian

### **Peña de Candamo, La** (Asturias)

Cavern at San Roman de Candamo, near Nalon.
Explored by E. Hernandez-Pacheco.

**References:** Hernandez-Pacheco, *CIPP*, Mem. Num. 24, 281 pp. (1919).

**Culture Sequence** (Hernandez-Pacheco) (based on mural art):

4. Upper Magdalenian
3. Middle Magdalenian
2. Lower Magdalenian
1. Aurignacian

Near the cavern of Peña de Candamo is a small cave called *Covacha de la Peña*, in which Hernandez-Pacheco found a Solutrean deposit.

### **Peña de Carranceja** (Santander)

Cave near Reocin.
Discovered and explored by H. Alcalde del Rio.

**References:** Obermaier, *PZ*, i, 185 (1909).

**Culture Sequence** (Obermaier):

2. Magdalenian
1. Solutrean

### **Pendo, El** or **San Pantaleon** (Santander)

Cave at Escobedo-Camargo.
Explored by M. de Sautuola, Alcalde del Rio, Breuil, Sierra, and O. Cendrero.

**References:** *CRC*, 36–39, pls. xxii and xxviii.

**Culture Sequence:**

3. Azilian
2. Magdalenian
1. Solutrean

### **Quintanal** (Oviedo)

Cave near Balmori (Llanes).
Explored by Alcalde del Rio, Count de la Vega del Sella in 1915.

**References:** Hernandez-Pacheco, *CIPP*, Mem. Num. 24, 25 (1919).

**Culture Sequence** (Hernandez-Pacheco):

5. Asturian
4. Azilian
3. Magdalenian
2. Lower Magdalenian
1. Upper Solutrean

### **Rascaño** (Santander)

Cave near Mirones.
Explored by L. Sierra, Hernandez-Pacheco, J. Carballo.

**References:** Obermaier, *HF*, 170–172, 316, 319.

**Culture Sequence** (Obermaier):

2. Azilian, harpoons
1. Magdalenian, harpoons

### **Riera, La** (Asturias)

Cave 50 m. (164.2 ft.) from cave of Cueto de la Mina, district of Llanes.
Explored by Count de la Vega del Sella, who discovered it.

**References:** Hernandez-Pacheco, *CIPP*, Mem. Num. 24, 25 (1919).

**Culture Sequence** (Hernandez-Pacheco):

5. Asturian
4. Azilian, typical harpoons
3. Magdalenian, harpoons with two rows of barbs
2. Magdalenian
1. Solutrean

### **Salitre** (Santander)

Cavern near Ajanedo-Miera.
Explored by L. Sierra.

**References:** Obermaier, *HF*, 170, 231.

**Culture Sequence** (Obermaier):

3. Magdalenian
2. Solutrean
1. Aurignacian

**San Isidro** (*see* **Madrid**)

**Sofoxo** (Asturias)

Cave on the right bank of the Nora river, district of Regueros.
Explored by Count de la Vega del Sella, who discovered it.

**References:** Hernandez-Pacheco, *CIPP*, Mem. Num. 24 (1919).

**Culture Sequence** (Hernandez-Pacheco):

2. Azilian or Magdalo-Azilian
1. Upper Magdalenian

**Valle** (Santander)

Cave near Rasines.
Explored by L. Sierra in 1905; Obermaier, Breuil, J. Bouyssonie.

**References:** Breuil and Obermaier, *Anthr.*, xxiii, 1–26 (1912); *ibid.*, xxiv, 1–16 (1913).

**Culture Sequence:**

3. Tardenoisian
2. Azilian
1. Upper Magdalenian, engravings on bone and staghorn

One of the very few stations in Spain where the reindeer has been found.

**Villaneuva** (Santander)

Cave in the Ayuntamiento of Villaescusa.
Explored by O. Cendrero and Jesus Carballo.

**References:** Obermaier, *HF*, 178, 319.

**Culture Sequence** (Obermaier):

2. Azilian
1. Magdalenian

## SWITZERLAND

**Birseck** (Basle)

Rock shelter at a château of same name, near Arlesheim.
Explored by F. Sarasin.

**References:** Sarasin, *CIA*, i, 566–570 (Geneva, 1913); Sarasin, *NDSNG*, liv, Abh. 2 (1918).

**Culture Sequence** (Sarasin):

3. Neolithic, crude pottery; stone and bone implements
2. Azilian, painted pebbles; recent fauna
1. Magdalenian, reindeer fauna

In the Azilian horizon, Sarasin found 122 painted pebbles, all of which had been broken. They were of various shapes: round, flat, and in the shape of a sausage. Apparently they had been carried from a small stream near-by and colored red, in most cases on one side only.

### Cotencher (Neuchâtel)

Cave in the valley of the Areuse at an altitude of 650 m. (2,134.2 ft.).

Discovered and partially explored (especially for bones of the cave bear) in 1867; since 1915 by A. Dubois, H. A. Stehlin, Paul Vouga, *et al.*

**References:** Stehlin and Dubois, *Eclogæ geologicæ Helvetiæ*, xiv, 4 pp. (1916).

**Culture Sequence** (Stehlin and Dubois):

4. Stalagmitic crust
3. Clay—0.60–1.00 m.
2. Mousterian, *Ursus spelaeus*, wolf, *Vulpes spec.*, *Lepus spec.*, *Mus spec.*, reindeer, horse, ibex, lynx, *Felis spelaea*, *F. pardus*, *F. catus* —1.80–2.00 m.
1. Brownish earth, marmot, *Cricetus cricetus*, *Eliomys spec.*, *Foetorius erminea*, *Ursus spelaeus*, wolf, *Vulpes spec.*, *Lepus spec.*, *Mus spec.*, reindeer

More than 95 per cent of the fossil animal remains belong to the cave bear.

### Drachenloch (St. Gallen)

Cavern at an elevation of 2,445 m. (8,027.7 ft.) near the top of Drachenberg, southerly from Ragatz (see Figs. 18, 19 and 66).

Explored by Theophil Nigg and Emil Bächler from 1917–22.

**References:** Bächler, *Jahrb. St. Gallischen naturw. Ges.*, lvii, Part I, 144 pp. (1921).

**Culture Sequence** (adapted from Bächler):

6. Surface deposit, remains of rodents, birds, etc.
5. Whitish gray deposit, perfectly preserved fossil remains of ibex, chamois, marmot, *Ursus arctos* (cave bear absent)—0.15–0.25 m.
4. Dark-red earth, wolf, fox, marmot, ibex, chamois, *Ursus arctos*, and cave bear, all remarkably well preserved—0.35–0.55 m.
3. Lower Mousterian (warm), reddish-brown deposit; hearth, fire pit, implements made of fibulae of cave bear and limestone; piles

of cave-bear skulls and long bones forming altar offerings; wolf, ibex, chamois, marmot, cave bear—0.60–0.80 m.
2. Lower Mousterian (warm), reddish-brown deposit; implements of bone and limestone; cave bear, ibex, chamois—0.25–0.40 m.
1. Whitish-gray cave earth—1.80–2.00 m.

### **Kesslerloch** (Schaffhausen)

Cave near Thayngen (or Thaingen).
Explored by Merck, 1873–74; Nüesch, 1893, 1899; Heierli, 1903.

**References:** Merck, *MAGZ*, xix, Heft I (1875); Rütimeyer, *AA*, viii, 123–131 (1875); Lindenschmit, *ibid.*, ix, 173–179 (1876); Nüesch, *Anzeiger f. Schweiz. Altertumskunde*, N.F., ii, 4–10 (1900); *ibid.*, vi, 185 (1904–05); Nüesch, Studer, and Schoetensack, *NDSNG*, xxxix, Heft II (1904); Nüesch, *MAGW*, xxx, 76–79 (1900); Obermaier, *Anthr.*, xvii, 77 (1906); Heierli, *NDSNG*, xliii, 214 pp., 32 pls. (1907).

**Culture Sequence:**

I. (Heierli)
4. Magdalenian, mammoth fauna, including *Vulpes lagopus*
3. Magdalenian, mammoth fauna
2. Magdalenian, mammoth fauna
1. Pre-Magdalenian, mammoth fauna

II. (Obermaier)
4. Upper Magdalenian
3. Middle Magdalenian
2. Lower Magdalenian
1. Upper Solutrean

Rutot believes all four horizons at Kesslerloch represent simply the evolution of Lower Magdalenian culture.

The principal collection from Kesslerloch is in the Rosgarten Museum at Constance (see Fig. 128).

### **Muhleloch** (Olten-Soloturn)

Rock shelter near the city of Olten.
Explored by Schweizer.

**Culture Sequence** (Schweizer):
3. Bronze Age
2. Sterile layer—1.5 m.
1. Magdalenian

### Schweizersbild (Schaffhausen)

Rock shelter 3 km. north of city of Schaffhausen (see Fig. 13).
Explored by J. Nüesch and Hausler, 1891–93.

**References:** Boule, *Nouvelles archs. des missions sci. et lit.*, iii, 87–109 (1892); Boule, *Anthr.*, iii, 633–634 (1892); Nüesch, *DASGN*, xxxv (1896); G. de Mortillet, *REA*, viii, 142–149 (1898); Nüesch, *NDSNG* (1902); Obermaier, *Anthr.*, xvii, 78–80 (1906).

**Culture Sequence** (Nüesch, Rutot):

7. Iron Age
6. Bronze Age
5. Neolithic, two dozen human sepultures; forest fauna
4. Breccia, steppe rodents and forest fauna
3. Middle Magdalenian, abundance of flint chips, harpoons, bone needles, batons, perforated shells, engraved and sculptured reindeer horn; steppe fauna
2. Magdalenian, slightly developed
1. Breccia, tundra fauna

The fauna is that of the reindeer; both mammoth and *Rhinoceros tichorhinus* are lacking.

The principal collection from Schweizersbild is in the museum at Zurich.

### Wildkirchli (Appenzell)

Cave near the top of the Ebenalp (see Fig. 17) in the Säntis range at an elevation of 1,477–1,500 m. (4,849.5–4,925 ft.).
Explored by Emil Bächler in 1903–04.

**References:** Bächler, *Verh. schweizer. naturforsch. Ges.* 74 pp., 4 pls. (St. Gallen, 1906).

**Culture Sequence** (adapted from Bächler):

12. Surface deposit—0.15 m.
11. Whitish to yellow lime-dust sinter—0.15–0.30 m.
10. Lower Mousterian (warm), cave bear; fine light-brown earth—0.30–0.60 m.
9. Stony deposit with seams of light-brown earth—0.60–1.45 m.
8. Lower Mousterian, cave bear abundant; splintered bones; dark-brown earth—1.45–1.70 m.
7. Stony deposit (large blocks)—1.70–2.40 m.
6. Stony layer mixed with dark earth—2.40–2.95 m.
5. Lower Mousterian, abundance of disintegrated fossil animal bones; dark to black earth—2.95–3.85 m.

4. Stony deposit mixed with brown to black earth—3.85–4.40 m.
3. Lower Mousterian, dark earth; abundance of fossil animal remains—4.40–4.85 m.
2. Lower Mousterian (interglacial), large weathered blocks of stone mixed with dark earth and bones—4.85–5.45 m.
1. Floor of native limestone

99.5 per cent of the fossil bones belong to the cave bear. Other species represented include cave lion, cave panther, Alpine wolf, wolf, ibex, chamois, red deer, marmot, marten, hermit crow. Artifacts occur at various levels from 0.50–0.70 m. down to horizon No. 1; a few crude bone implements were also found.

# APPENDIX II

## REPERTORY OF PALEOLITHIC ART

In the whole domain of prehistoric archeology, no field has attracted more attention than that of Quaternary art; and rightly so since its appearance marks a distinct epoch in mental evolution. The publications, some in pamphlet form, others in quarto volumes, dealing chiefly with Quaternary art are many. The principal contributions are to be found in the works of Lartet and Christy, Girod and Massenat, Piette, Cartailhac, Breuil, Obermaier, Capitan, and Peyrony. Among the notable compilations, those of Piette, Breuil, Reinach, and Hoernes should receive first mention. Of prime importance in the special field of stationary art are the series of monographs published by the *Institut de Paléontologie Humaine* and entitled *Peintures et Gravures Murales des Cavernes Paléolithiques* (Monaco, 1906), and the memoirs of the *Comision de Investigaciones Paleontologicas y Prehistoricas* (Madrid).

The value attached to Paleolithic sites, especially those containing examples of parietal art, is indicated by the number of those placed permanently under the protection of the government or that of local authorities. The lists of stations[1] which follow are arranged alphabetically under the various countries; they include references as well as data bearing on the nature of the art objects from each station.

### AUSTRIA

**Gudenus** (Lower Austria)

Cave west of Krems.

**Reference:** Obermaier and Breuil, *MAGW*, xxxviii, 277–294 (1908).

**Portable Art:** Engraved needlecase of bird bone (Magdalenian).

* **Willendorf** (Lower Austria)

Loess station at Willendorf, near Spitz.

**Reference:** Szombathy, *KB*, xl, Nos. 9–12 (1909).

[1] In certain Spanish stations, some of the art may date from post-Paleolithic times.

*The most important art stations are marked by asterisks—two indicating first rank and one second rank.

**Portable Art:** Nude human female figure (see Fig. 160), the so-called "Venus of Willendorf" (late Aurignacian).

## BELGIUM

### Coléoptère, Le (Luxembourg)

Cave on the Ourthe river in the commune of Bomal, 40 km. (25 mi.) from Liège.

**Reference:** J. Hamal-Nandrin, *RA*, —, 1924.

**Portable Art:** Ivory figurine of an insect (coleopter) sculptured in ivory and provided with two holes for suspension (Magdalenian).

### Goyet (Namur)

Cavern at Mozet-les-Tombes, near Namur.

**Reference:** Dupont, *Mat.* v, Pl. xvi (1869).

**Portable Art:** Baton of reindeer horn with engraving of trout (Upper Aurignacian); engraved bone (Middle Magdalenian).

### Magrite (Namur)

Cave near Pont-à-Lesse.

**References:** Dupont, *Les temps prêhs. en Belgique: l'homme pendant les âges de la pierre dans les environs de Dinant-sur-Meuse*, 2d edit. (1872); Rutot, *MARB*, "Classe des beaux-arts," i (1919).

**Portable Art:** Engraving on fragment of reindeer horn; human figurine of ivory (Upper Aurignacian).

## CZECHOSLOVAKIA

### Brünn (Moravia)

Loess station at Franz Josef Strasse, Brünn.

**Reference:** Alex. Makowsky, *MAGW*, xxii, 73–84, Pls. 1–3 (1892).

**Portable Art:** Ivory statuette of *Homo* (Solutrean).

### Kostelik (Moravia)

Cave about 12 km. (7.5 mi.) from Brünn, near Mokrau.

**References:** F. A. Krasser, *MAGW*, xi, 98–99 (1881); Kříž, *Anthr.*, x, 257–280 (1899).

**Portable Art:** Jawbone of horse carved to represent fish; engraved signs on slate (Magdalenian); head of *Bos primigenius* engraved on bone.

**Kulna** (Moravia)

Cavern near Sloup.

**Reference:** Kříž, *Anthr.*, viii, 513–537 (1897).

**Portable Art:** Ornamented bone objects (Magdalenian).

**Pekarna,** or **Diravica** (Moravia)

Cave near Mokrau.
Engraving on slate.

* **Předmost** (Moravia)

Loess station near Prerau Junction.

**References:** Obermaier, *MV*, 299–300; K. Absolon in Klaatsch-Heilborn, *Der Werdegang der Menschheit und die Entstehung der Kultur* (Brünn, 1918).

**Portable Art** (Aurignacian): Six human female figures carved from metacarpals of the mammoth; stylistic engraving of female figure on ivory; incised herringbone patterns on ribs of the mammoth; incised wave ornament on large rib.

## ENGLAND

**Bacon Hole** (Wales)

Cavern near Swansea.

**Reference:** Sollas, *JAI*, xliii, 333–335 (1913).

**Mural Art:** Frescoes of slight importance (10 red bands, fanlike).

**Robin Hood** (Derbyshire)

Cave at Creswell Crags.

**Reference:** Boyd Dawkins, *Early Man in Britain*, 185 (1880).

**Portable Art:** Engraving of horse on fragment of a rib (Aurignacian or Solutrean).

**Sherborne** (Dorset)

Surface find in quarry débris near the Bristol road.

**Reference:** Smith-Woodward, *QJGS*, lxx, 100–101 (1914).

**Portable Art:** Figure of a horse engraved on bone.

## FRANCE

### Aiguèze (*see* Chabot)

### Ammonite (Charente)

Cave near the cave of Le Placard, commune of Vilhonneur. Explored by A. P. Ragout.

**Portable Art:** Engraving of Cervidae on bone.

### Arcy-sur-Cure (Yonne)

Grotte du Trilobite.

**References:** Abbé Parat, *CIA*, 63–78 (Paris, 1900); *CFG*, 147–148.

**Portable Art:** Engraving on reindeer bone of stem with seven alternating leaves; engraving on slate of *Rhinoceros tichorhinus* and Bovidae (Upper Aurignacian).

### Arlay (Jura)

Cave north of Lons-le-Saunier, near the river Seille.

**References:** Girardot, *AFAS*, i, 280 (Besançon, 1893).

**Portable Art:** Engraving of a fish.

### * Arudy (Basses-Pyrénées)

Grotte d'Espélungues, Grotte de Saint-Michel.

**Reference:** Piette, *APAR*, viii, xxx, lxxxv, lxxxvi, lxxxvii–xciii.

**Portable Art:** Representing the horse for the most part (bird, fish, wild goat, fox, *Felis*); figures in the round; engravings on bone and reindeer horn; ornamented batons and spear throwers; volutes and spirals (Magdalenian) (see Fig. 180).

### Aurensan (Hautes-Pyrénées)

Cave near Bagnères-de-Bigorre.

**Reference:** E. and Ch. L. Frossard, *Mat.*, vi, 205–216 (1870).

**Portable Art:** Engravings of wild goat and horse on bone; and *Homo* on slate.

**Batie** (Lot)

Cave in the commune of Pinsac, across the Dordogne river from Lacave.

**Reference:** A. Viré, *CPF*, 215 (Périgueux, 1905).

**Portable Art:** Engraving of horse on bone (Magdalenian).

**Bedeilhac** (Ariège)

Cavern near Tarascon.

**Reference:** Cartailhac and Breuil, *Anthr.*, xxi, 149–150 (1910).

**Mural Art:** Bison in brown; red signs and dotted bands; figures in black of the human hand.

**Bellet** (*see* **Planche-Torte**)

* **Bernifal** (Dordogne)

Cave 5 km. (3.1 mi.) from Les Eyzies.

**Reference:** Capitan, Breuil, and Peyrony, *REA*, xiii, 202–209 (1903).

**Mural Art:** Engravings of bison, horse, mammoth; tectiform signs (Magdalenian).

**Beyssac** (Dordogne)

Cave in the valley of the Beune, near the château of Beyssac.

**Reference:** Capitan, Breuil, and Peyrony, *Anthr.*, xxvi, 517–518 (1915).

**Mural Art:** Negative figure of a human hand.

**Bize** (Aude)

Two caves near Bize.

**Reference:** Cartailhac, *Mat.*, xii, 319 (1877).

**Portable Art:** Engraved chevrons on bone; spatula with engraving of a mammal (fragmentary).

**Boeufs, Les** (*see* Lespugue)

**Bout-du-Monde, La** (Dordogne)

Station near Les Eyzies.

**Reference:** *CRC*, 225.

**Portable Art:** Engraving of a hind with its young on limestone; a bison on schist; reindeer and horse on bone; a perforated baton with engravings of a bison and horse on one side, and four bison heads on the other (Magdalenian).

### * Brassempouy (Landes)

Grotte du Pape.

**References:** Piette, *Anthr.*, vi, 129–151, Pls. I–VII (1895); *APAR*, lxx–lxxxi.

**Portable Art:** Engravings and figures in the round, including horse, fish, and seal; human figurines of ivory, including so-called "Venus of Brassempouy" (Aurignacian) (see Figs. 125, 126, and 161).

### * Bruniquel (Tarn and Tarn-et-Garonne)

Five rock shelters and caves on the banks of the Aveyron.

**References:** Cartailhac, *Anthr.*, xiv, 129–150, 295–315 (1903); *APAR*, ii–v.

**Portable Art:** Engravings and figures in the round, the most notable being a dart thrower of reindeer horn representing a mammoth (originally with eyes of inlay), and the pair of reindeer (now in the British Museum) (see Figs. 102 and 129); figures of *Bos*, fish, musk ox, chamois, stag, wild goat, and Capridae; ornamented batons (one with *Felis*) and dart throwers (horse); ten stones with engravings of the reindeer, bison, horse, wolf, etc., now in the British Museum (Magdalenian).

### Calévie, La (Dordogne)

Cave some 500 m. (0.3 mi.) below Bernifal.

**Reference:** Capitan, Breuil, and Peyrony, *REA*, xiv, 379–381 (1904).

**Mural Art:** Engravings of the horse (Aurignacian and Magdalenian types).

### Cambous, Les (Lot)

Rock shelter in the valley of the Célé, commune of Ruëyres.

**Reference:** Bergougnoux, *Temps préhs. en Quercy*, 33 (1887).

**Portable Art:** Head of chamois and tail of fish (both fragmentary) engraved on reindeer horn.

### ** Cap-Blanc (Dordogne)

Rock shelter in the commune of Marquay, near Les Eyzies.

**Reference:** Lalanne and Breuil, *Anthr.*, xxii, 385–402 (1911).

**Mural Art:** Six large (the largest, 2.15 m. in length) figures of the horse, two groups of three each (see Fig. 140); bison in low relief that had fallen from the wall in prehistoric times (Magdalenian).

**Portable Art:** Beetle carved from ivory; engraving on bone (Magdalenian)

### **Chabot,** also called **Jean-Louis** (Gard)

Cave in the commune of Aiguèze.

**Reference:** L. Chiron, *Bull. Soc. d'Anthr. de Lyon*, viii (1889).

**Mural Art:** Engravings of the mammoth (mere tracings) (Magdalenian).

### **Chaffaud** (Vienne)

Grotte du Puits in the commune of Savigné, near Chaffaud.

**References:** E. Lartet, *ASNZ*, xv (1861); René Fauvelle, *L'homme*, ii, 682–687 (1885); E. Cartailhac, *Anthr.*, xiv, 180 (1903); *CRC*, Fig. 224, p. 226.

**Portable Art:** Troops of horses engraved on stone (see Fig. 132); figures of two hinds on the canon bone of a reindeer (see Fig. 6), the first example of Paleolithic art ever reported (Upper Magdalenian). Original in museum at Saint-Germain; fish carved in reindeer horn with contours cut away (original at Poitiers).

### **Chaise, La** (Charente)

Cave in the commune of Vouthon.

**Reference:** *CRC*, 225.

**Portable Art:** Figures of hind engraved on bone (Magdalenian).

### **Champs-Blancs,** or Jean-Blanc (Dordogne)

Two rock shelters in the commune of Bourniquel.

**Reference:** Peyrony, *AFAS*, 522–528 (Nîmes, 1912).

**Art:** Bisons cut in relief on blocks of limestone (Lower Magdalenian).

### **Chancelade** (*see* **Raymonden**)

### * **Colombière, La** (Ain)

Rock shelter in the valley of the Ain, near Poncin.

**Reference:** Mayet and Pissot, *Annales de l'Univ. de Lyon*, N.S., "Sciences, médecine," fasc. 39, 205 pp., 25 pls. (1915).

**Portable Art:** Engravings of *Ursus*, *Felis*, *Bison*, horse, Rhinoceros, reindeer, musk ox, deer, wild sheep on pebbles and bone; human figures engraved on bone (Magdalenian or Aurignacian).

### Comarque (Dordogne)

Cave in the valley of the Beune near the château of Comarque, commune of Sireuil.

**Reference:** Capitan. Breuil, and Peyrony, *Anthr.*, xxvi, 505–514 (1915).

**Mural Art:** Engravings and low reliefs of horse and other animals, including a cave bear (Magdalenian).

### ** Combarelles, Les (Dordogne)

Cavern in the commune of Tayac, near Les Eyzies.

**References:** Rivière, *AFAS*, ii, 710–714 (Caen, 1894); Capitan and Breuil, *REA*, xii, 33–46 (1902).

**Portable Art:** Engraved reindeer horn; engraving of Cervidae on scapula (Lower and Middle Magdalenian according to Peyrony).

**Mural Art:** Horse; mammoth (see Fig. 117); reindeer; bison (see Fig. 118); Bovidae; antelope; wolf; fox; wild goat; *Felis;* cave bear; Capridae, etc. Peyrony believes some of the mural art is of Aurignacian and Solutrean age, but that most of it belongs to the Lower and Middle Magdalenian Epochs.

### Conduché (Lot)

Cave in the valley of the Célé.

**Reference:** Bergougnoux, *Temps. prêhs. en Quercy* (1887).

**Portable Art:** Engraving on bone (Magdalenian).

### Corgnac (Dordogne)

Cave in the commune of Saint-Front.

**References:** Masfranc, *Mat.*, xxii, 46–47 (1888); *CFG*, 177.

**Portable Art:** Engraving of wounded reindeer on bone.

### Cro-Magnon (Dordogne)

Rock shelter at Les Eyzies.

**Reference:** Rivière, *AFAS*, 778 (Lyon, 1906).

**Portable Art:** Engravings on bone (of doubtful origin); one representing a bison and the other a woman in full-length profile (Aurignacian?).

### Crouzade, La (Aude)

Cave at Gruissan, near Narbonne.

**Reference:** Cartailhac, *Mat.*, xii, 324 (1877).

**Portable Art:** Animal heads engraved on bone (two figures of the horse); bone pendant with dotted ornament (Magdalenian).

### Croze à Gontran, La (Dordogne)

Cave at Tayac.

**Reference:** Capitan, Breuil, and Peyrony, *RA*, 277–280 (1914).

**Mural Art:** Engravings of mammoth, bison, horse, *Bos*, wild goat; groups of parallel lines (Aurignacian).

### Croze de Tayac, La, or Morsodou (Dordogne)

Rock shelter in the commune of Tayac.

**References:** Rivière, *AFAS*, ii, 756–760 (1901); 779 (Lyon, 1906).

**Portable Art:** Engraving of a fish on reindeer horn.

### Crozo de Gentillo (Lot)

Cave in the commune of Lacave.

**Reference:** Viré and Niederlander, *BSPF*, xviii, 269–270 (1921).

**Portable Art:** Baton of reindeer horn with incised signs suggestive of primitive writing; head of reindeer incised on plaque of limestone.

### * David (Lot)

Cave near Cabrerets.
Discovered in 1923 by David, a boy of 14.
Explored by the Abbé Lemozi and David in 1922 and 1923.

**References:** *L'Illustration*, Oct. 13, 1923; *Illustrated London News*, Oct. 20, 1923.

**Mural Art:** Some forty mural figures painted in red or black, or engraved. Mammoths, bisons, Equidae, fish (pike); some ten figures of the human hand in red ocher; fine engraving of a bear; engravings, paintings, bones, and fossilized excrement of *Ursus;* engraved figures of men (ithyphallic) followed by women with pendant breasts (Aurignacian and Magdalenian).

**Dufaure and Duruthy** (*see* **Sordes**)

**Eglises, Les** (Ariège)[2]

Cave in the commune of Ussat.
Explored in part by Dr. Cuguillère.

**Mural Art:** Figures of the wild goat, both male and female, in red, also a human figure under a tectiform sign; figure of a bison in black.

**Enlène** (Ariège)

Cave in the commune of Montesquieu-Avantes.

**Reference:** Count Begouen, *Anthr.*, xxiii, 287–305 (1912).

**Portable Art:** Head of horse carved from bone; dart thrower of reindeer horn ornamented with figure of Bovidae (or Cervidae) (Magdalenian).

*** Eyzies, Les** (Dordogne)

I. Cave in the commune of Tayac, near Les Eyzies.

**Reference:** Capitan, Breuil, and Peyrony, *REA*, xvi, 429–440 (1906).

**Portable Art:** Engravings on bone, reindeer horn, and schist of horse, bison, Bovidae, hind, reindeer, wild goat, Cervidae (Magdalenian).

II. Abri du Château in the village of Les Eyzies.

**Portable Art:** Engravings on a rib of stylistic human figures, each with a staff on the shoulder; human hands, bison (Magdalenian).

**Fées, Les** (*see* **Marcamps**)

**Ferrassie, La** (Dordogne)

Rock shelter in the commune of Savignac-du-Bugue, near Le Bugue.

**Reference:** Capitan and Peyrony, *REA*, xxxi, 92–112 (1921).

**Portable Art:** Crude engravings and sketches in color; reindeer (?), wild goat (?), horse, rhinoceros, and vulva (Middle and Upper Aurignacian).

**Figuier, Le** (Ardèche)

Cave opposite Chabot, in the commune of Saint-Martin-d'Ardèche.

**Reference:** R. Vallentin, *Mém. Acad. de Vaucluse*, ix, 344–348 (1890).

**Portable Art:** Engraving of mammoth tusks on bone (Magdalenian).

[2] Near Les Eglises is the Grotte de l'Hermite where in 1921 Dr. Cuguillère found a drawing in yellow ocher in the style of the statue menhir human figures; it is probably of Neolithic age.

### Fontarnaud (Gironde)

Cave.

**References:** Breuil, *AIB*, 114 (1905); Breuil, *Anthr.*, xix, 190 (1908).

**Portable Art:** Heads of Cervidae and birds engraved on same bone; engraving of a fish on reindeer horn.

### ** Font-de-Gaume (Dordogne)

Cavern in the commune of Tayac, near Les Eyzies (see Figs. 153, 154 and 171).

**Reference:** *CFG*, vii + 271 pp., 65 pls.

**Mural Art:** Many polychrome frescoes and engravings representing the mammoth, bison, horse, woolly rhinoceros (Upper Aurignacian), wolf, reindeer, *Bos*, *Felis*, cave bear, stag, Cervidae, etc.; tectiform signs; the human hand (see Figs. 119, 121–124, 130, and 139).

**Portable Art:** Head of horse engraved on bone.

### * Gargas (Hautes-Pyrénées)

Cavern in the commune of Aventignan.

**Reference:** Cartailhac and Breuil, *Anthr.*, xxi, 129–148 (1910).

**Mural Art:** Incised figures of elephant, bison, horse; also entrelacs, arabesques, etc.; human hands in red and black (see Fig. 327); figures of bison and horse traced in clay.

**Portable Art:** Engraving on stone in Upper Aurignacian deposit.

### Gaubert (Dordogne)

Rock shelter in the commune of Tayac, near the cave of La Mouthe.

**Reference:** Rivière, *AFAS*, 787 (Lyon, 1906).

**Portable Art:** Figure of a plant engraved on a metatarsal of a ruminant.

### * Gorge d'Enfer (Dordogne)

**Reference:** Girod and Massenat, *Les stations de l'âge du renne*, etc., ii, pl. i (Paris, J. B. Baillière et Fils, 1906).

**Mural Art:** Figure of a salmon in low relief on ceiling (Middle or Upper Aurignacian) of the Abri du Poisson.

**Portable Art:** Baton of reindeer horn carved to represent a double phallus.

*** Gourdan** (Haute-Garonne)

Cave near Montréjeau.

**References:** Piette, *Anthr.*, xv, 156, 175 (1904); *APAR*, pls. ii, iv, vii-x, xxvii, xxx, lxviii, lxxxii–lxxxiv.

**Portable Art:** For the most part engravings on reindeer horn (including batons), stone, and bone: anthromorphic figures, Canidae, *Rhinoceros tichorhinus*, *Felis*, horse, *Bos*, Cervidae, reindeer, wolf, hind, moose (see Fig. 136), goat, chamois, Saiga antelope, seal, bird, and fish; alphabetiform signs (Magdalenian).

*** Grèze, La** (Dordogne)

Rock shelter in the commune of Marquay.

**Reference:** Capitan, Breuil, and Ampoulange, *REA*, xiv, 320–325 (1904).

**Mural Art:** Engravings of bisons.

**Harpons, Les** (*see* **Lespugue**)

**Hoteaux, Les** (Ain)

Cave in the commune of Rossillon.

**Reference:** Tournier and Guillon, *Les hommes préhs, dans l'Ain*, 105 pp., 7 pls. (Bourg, 1895).

**Portable Art:** Perforated baton with engraved figure of a stag (proto-Magdalenian).

*** Isturitz** (Basses-Pyrénées)

Cave near the village of Isturitz, some 10 km. (6.25 mi.) east of Hasparren.

**References:** Boule, *Anthr.*, vii, 725 (1896); Passemard, *R. Arch.*, xv, 1–45 (1922).

**Mural Art:** Parietal bas-reliefs of Cervidae.

**Portable Art** (Magdalenian): Figures in the round; bas-reliefs; engravings of Felidae, *Bison*, *Ursus*, Equidae, Cervidae, fish, bird, hare; decorated batons.

**Lacave** (Lot)

Cave near the village of Lacave.

**Reference:** Viré, *Anthr.*, xvi, 411–429 (1905).

**Portable Art** (Magdalenian): Engravings on bone and reindeer horn, including an antelope head on the latter; decorated baton.

### Lacoste (*see* Planche-Torte)

### ** Laugerie-Basse (Dordogne)

Rock shelters (the classic station, La Grange, and Les Marseilles) in the commune of Tayac, near Les Eyzies.

**References:** Lartet and Christy, *Reliq. aquit.*, 5, 137, 169, 256–258, 288 (1865–75); *APAR*, ii, iv–vii, xxvii–xxx; Peyrony and Maury, *RA*, xxiv, 134–154 (1914); M. Bourlon, *Anthr.*, xxvii, 1–26 (1916); J. Maury, *Laugerie-Basse, Les fouilles de M. J.-A. Le Bel*, 20 pp. (Le Mans, imprimerie Mannoyer, 1920).

**Portable Art:** Many engravings, chiefly on bone, reindeer horn, and stone, also figures in the round and with contours cut away; among the best known are the so-called (wrongly) "combat de rennes" engraved on schist; "femme au renne" with engraving of horse on reverse side; "chasse à l'aurochs"; "Venus impudique," a statuette in ivory; poniard of reindeer horn carved to represent a reindeer; reindeer on reindeer horn; fish on bone; heads of the horse with contours cut away; reindeer head in the round; bison and reindeer engraved on stone; head of horse engraved on stone; Canidae, wild goat, mammoth, Cervidae, red deer, *Felis*, otter; stone lamps. Laugerie-Basse is perhaps the richest of all Paleolithic stations in respect to portable art objects, some 180 examples having been found there (see Figs. 105 and 155).

### * Laugerie-Haute (Dordogne)

Two rock shelters in the commune of Tayac, near Les Eyzies.

**References:** *CFG*, Figs. 139, 169; MacCurdy, *Amer. anthr.*, N.S., xxv, 72–89 (1923).

**Portable Art:** Decorated baton of reindeer horn (stag heads); painting on a block of limestone; glutton engraved on reindeer horn; head of horse engraved on young reindeer horn; two mammoths engraved on reindeer horn; head of musk ox carved from limestone (in the round); bas-reliefs on limestone, including head of antelope; equine figure engraved on limestone slab (see Fig. 134).

### * Laussel (Dordogne)

Rock shelter in the valley of the Beune, on the domain of Laussel, commune of Marquay.

**Reference:** Lalanne, *Anthr.*, xxiii, 129–149 (1912).

**Portable Art:** Five human figures in relief on stone, the best known being the "Venus of Laussel," a female figure holding a bison horn (see Fig. 162).

The figure had been painted, some of the ocher being still visible. One of two others belonging to the same female type is in the Berlin *Museum für Völkerkunde*. A fourth relief is an athletic male type (see Fig. 165), and the fifth a group of two figures, one a female, the other probably a male. Relief figures of a horse, hyena, and hind, the head of the last engraved on the reverse side of the stone.

### * **Lespugne,** also known as **Lespugue** (Haute-Garonne)

Grotte des Harpons, Grotte des Rideaux, and Grotte des Boeufs.

**References:** DE SAINT-PÉRIER, *BSPF*, ix, 210–212, 498–518 (1912); DE SAINT-PÉRIER, *Anthr.*, xxx, 209–234 (1920); *ibid.*, xxxii, 361–381 (1922).

**Portable Art:** Magdalenian engravings on bone, chiefly of the horse also of cave bear and fish (Grotte des Harpons and Grotte des Boeufs); stylistic sculpture in bas-relief on reindeer horn in the form of circles and sigmoid patterns similar to that from Arudy and Lourdes (Grotte des Harpons).

Upper Aurignacian female ivory statuette (Grotte des Rideaux), 14.7 cm. in height, discovered in 1922 (see Fig. 159); the same type as those from Grimaldi, Brassempouy, Willendorf, etc.

### ** **Limeuil** (Dordogne)

Rock shelter at the mouth of the Vézère river.

**Reference:** CAPITAN, PEYRONY, and BOUYSSONIE, *AIB*, 124–131 (1913).

**Portable Art** (Magdalenian): Many engravings, chiefly on stone and reindeer horn, of reindeer, horse, bison, *Bos*, and wild goat; red deer engraved on a baton.

### **Liveyre** (Dordogne)

Cave in the commune of Tursac.

**References:** RIVIÈRE, *CPF*, 490–491 (Périgueux, 1905); BOURLON, *HP*, 30 (1906).

**Portable Art:** Engravings on stone pendants (reindeer, wild goat, etc.): animal head engraved on a baton of reindeer horn.

### ** **Lorthet** (Hautes-Pyrénées)

Cavern in the valley of the Neste.

**References:** PIETTE, *Anthr.*, xv, 129–176 (1904); *APAR*, ii, iv, vii, x, xxx, xxxix–xlii, xlvii, lx.

**Portable Art** (Upper Magdalenian): Various engravings on stone and reindeer horn (Canidae, horse, Cervidae, Bovidae, reindeer, hind, goat, roebuck, glutton, fish); figures with contours cut away (see Fig. 127).

### ** Lourdes (Hautes-Pyrénées)

Cave called L'Espelunge or Les Espélugues.

**References:** Piette, *Anthr.*, xvii, 27–53 (1906); *APAR*, ii, xi–xv, xvii–xxvi, xxxii–xxxviii, xcviii-c.

**Portable Art** (Magdalenian): Many sculptured figures and engravings including conventionalized designs derived from the eye, horn, and other animal features (see Fig. 133); horsehead pendants with contours cut away; figures of the horse (see Fig. 172), Bovidae, bison, reindeer, bird, Cervidae, red deer, cave bear, fish, rhinoceros, wolf (on reindeer horn).

### ** Madeleine, La (Dordogne)

Rock shelter on the right bank of the Vézère, commune of Tursac (see Figs. 93 and 94).

**Reference:** Lartet and Christy, *Reliq. aquit.*, 5, 20, 137, 168, 206, 245, 255, 265 (1865–75).

**Portable Art** (Magdalenian): Many important examples, including engraved and sculptured dart throwers, one in ivory representing the hyena (see Fig. 104); figures of the reindeer, horse, red deer, Bovidae, Cervidae, ruminants, bison (see Fig. 173), *Felis*, *Homo*, mammoth. La Madeleine is one of the richest stations in portable art after Laugerie-Basse.

### Mairie, La (*see* Teyjat)

### Marcamps (Gironde)

Grotte des Fées, near the cave of Pair-non-Pair.

**Reference:** Daleau, *Mém. Soc. arch. de Bordeaux*, i, Pl. II (1875).

**Portable Art:** Reindeer horn sculptured to represent human (?) head.

### Marcenac (Lot)

Cavern in the commune of Cabrerets, near the village of Cabrerets. Explored by the Abbé Lemozi in 1920.

**Reference:** Lemozi, *BSPF*, xvii, 7 pp. (1920).

**Mural Art** (Aurignacian): Drawings of bison and horse in color; engravings of red deer and wild goat; groups of incised parallel lines as at Gargas.

### * Marsoulas (Haute-Garonne)

Cave in the commune of Marsoulas, near Salies-du-Salat.

**Reference:** Cartailhac and Breuil, *Anthr.*, xvi, 431–444 (1905).

**Mural Art:** Engravings and paintings of the bison and *Bos;* engravings of the horse and wild goat, Cervidae; anthropomorphic figures; various signs, including tectiforms in color.

**Portable Art:** Engraving of bison on bone (Lower Magdalenian).

### ** Mas d'Azil (Ariège)

Stations in a subterranean gallery on the Arise river (see Fig. 255).

**References:** Piette, *Anthr.*, xv, 129–176 (1904); *APAR*, xxxi, xliii–xlvi, xlviii–lix, lxi–lxvii, lxix, xciv–xcvii; Begouen and Breuil, *Bull. Soc. arch. du Midi de la France* (Toulouse, 1912–13).

**Mural Art:** Engravings and paintings in red of hind, reindeer, horse, and bison.

**Portable Art** (Magdalenian): Many sculptured and engraved figures including the horse, reindeer, wild goat, Bovidae, *Bos*, Canidae, Cervidae, Equidae, red deer, ruminant, bison, bird (see Fig. 103), fish, antelope, goat, wild boar, *Homo*, anthropomorphic figures (see Fig. 168).

### Massat (Ariège)

Two caves, an upper and a lower.

**Reference:** G. de Mortillet, *Mat.*, iv, 467 (1868).

**Portable Art** (Magdalenian): Engravings on stone, bone, and reindeer horn; noted for engraving of bear on pebble; bear's head on a baton of staghorn; Cervidae, Capridae, reindeer.

### Monconfort, or Montconfort (Haute-Garonne)

Rock shelter at Saint-Martory.

**Reference:** A. de Mortillet, *BMSA*, 5th ser., i, 261 (1900).

**Portable Art:** Engraved bone.

### * Montespan (Haute-Garonne)

Cave in the commune of Montespan, near Saint-Gaudens.
Discovered by Jean Cazedessus.
Explored by Norbert Casteret in August, 1923.

**References:** Begouen and Casteret, *RA*, xxxiii, 533–545 (1923); Capitan, *ibid.*, 545-550 (1923); *Illustrated London News*, Nov. 3, 1923.

**Mural Art:** Some twenty animal figures modeled (in the round) in clay and partially destroyed by the action of the elements. A headless bear, which might once have been provided with a real bear's head, since fragments of a skull of *Ursus* were found between the paws of the statue (length 1.10 m.); two great felines leaning against the wall (1.50 and 1.60 m.); two horses in high relief; horses and bisons (ancient Magdalenian) incised in the clay of the cavern floor (see Fig. 149) and engraved on the wall; human vulva modeled on a plaque of clay.

### Montfort (Ariège)

Rock shelters on the Salat river, near Saint-Girons.

**References:** Alcalde del Rio, Breuil, and Sierra, *CRC*, Fig. 219 (2); Begouen, Cuguillère, and Miquel, *RA*, xxxii, 230–232 (1922).

**Portable Art** (Magdalenian): Head of hind engraved on stone; engraving on bone.

### Montgaudier (Charente)

Cave in the commune of Montbron.

**Reference:** Cartailhac, *France prèh.*, 2d edit., Fig. 41 (Paris, 1903).

**Portable Art** (Upper Magdalenian): Baton of reindeer horn with engraved figures of eels and seals.

### Morts, Les (*see* Planche-Torte)

### * Mouthe, La (Dordogne)

Cavern in the village of La Mouthe, commune of Tayac.

**Reference:** Rivière, *Les parois gravées et peintes de la Grotte de la Mouthe* (Paris, Sleicher Frères, 2d edit., 1905).

**Mural Art:** Engravings and paintings of mammoth, wild goat, horse, bison, reindeer, etc.

**Portable Art:** Stone lamp with engraved figure of wild goat on the bottom.

**Mouthiers** (Charente)

Cave near Angoulême.

**Reference:** G. Chauvet, *BSAHC* (1910).

**Portable Art:** Ornamented harpoon.

**Murat** (Lot)

Rock shelter in the Alzou valley near Rocamadour. Explored by the Abbé Lemozi.

**Reference:** Lemozi, *BSPF*, xvii, 7 pp. (1920).

**Portable Art:** Engravings of the horse on stone (Magdalenian); hind engraved on a pebble.

**Nancy** (Dordogne)

Cave at Vieil-Mouly, commune of Sireuil.

**Reference:** Capitan, Breuil, and Peyrony, *Anthr.*, xxvi, 515–517 (1915).

**Mural Art:** Engravings and low reliefs of the horse, bison, and wild goat.

**Neschers** (Puy-de-Dôme)

Rock shelter on the slopes of Mount Tartaret, at Blanzat.

**References:** Pommerol, *AFAS*, ii, 666 (1876); Boule, *La géogr.*, xiii, 359–363 (1906).

**Portable Art** (Magdalenian): Engraving of horse on reindeer horn.

** **Niaux** (Ariège)

Cavern in the commune of Niaux, near Tarascon.

**Reference:** Cartailhac and Breuil, *Anthr.*, xix, 15–46 (1908).

**Mural Art:** Many drawings, mostly in black, of the bison, horse, wild goat, etc., some represented as wounded by darts; signs in red and black; club-shaped figures; figures of fish traced in the clay of the cavern floor.

**Ombrive, L'** (Ariège)

Cavern near Niaux.

**Reference:** J. B. Noulet, *Archives, du Musée hist. nat. Toulouse*, 89–128 (1882).

**Mural Art:** Figure of a bison in black.

### Oullins (Gard)

Station in the commune of Gard.

**Reference:** *RP*, 281 (1907).

**Mural Art:** Engravings.

### * Pair-non-Pair (Gironde)

Cave at Marcamps.

**Reference:** F. Daleau, *Actes Soc. arch.*, 236 (Bordeaux, 1897).

**Mural Art** (Middle Aurignacian): Engravings including a hind, bison, mammoth, and ruminant (see Fig. 114); facsimile of a *Cypraea* shell carved from ivory with a large loop for suspension.

### Pépue, La (Dordogne)

Rock shelter at Peyrelevade in the commune of Manaurie.

**Reference:** Peyrony, *RA*, xxxii, 116 (1922).

**Mural Art:** Crude mural figures of horse and a horned animal incised and suggested by contours of the rock itself.

### * Placard, Le (Charente)

Cave near Rochebertier, commune of Vilhonneur (see Fig. 252).

**Reference:** Chauvet, *BSAHC*, 242 (1896); *APAR*, I, xvi.

**Portable Art** (Magdalenian): Sculptured figures and engravings (see Fig. 97), including alphabetiform signs on a bird bone (see Fig. 179), figures of Bovidae, Cervidae, hind, fish, horse, bison, fox (see Fig. 175), and *Rhinoceros tichorhinus*.

### Planche-Torte (Corrèze)

Several caves, Lacoste, Pré-Aubert, Les Morts, and Bellet, near Brive.

**References:** L. Bardon, J. and A. Bouyssonie, *La Grotte Lacoste* (Brive, 1910); L. Bardon, J. and A. Bouysonnie, *REA*, xx, 28–40, 60–71 (1910); *ibid.*, xxx, 177–189 (1920).

**Portable Art** (Aurignacian): Animal head engraved on slate (Lacoste); wild goat engraved on bone (Les Morts); engraving of horse (?) on stone (Pré-Aubert); engraving of hind on stone (Bellet)

**Poisson, Grotte du** (*see* **Gorge d'Enfer**)

**Pont-du-Gard** (Gard)

Cave of La Salpêtrière, commune of Vers.

**Reference:** Cazalis, *Mat.*, vii, Pl. 2 (1871).

**Portable Art:** Figures of fish and horse on bone.

* **Portel, Le** (Ariège)

Cave in the commune of Loubens.

**References:** Breuil, L. Jammes, and R. Jeannel, *AS* (June 1, 1908); Jammes and Jeannel, *AFAS*, 811–813 (Lille, 1909).

**Mural Art:** Figures in red and black, including horse, bison, red deer, reindeer, a human figure, and various signs.

**Portable Art** (Magdalenian): Figures with contours cut away.

**Pouzet, Le** (Dordogne)

Cave on the left bank of the Vézère, at Terrasson.

**Reference:** *CFG*, 189.

**Portable Art:** Fragmentary figure of *Cervus elaphus* engraved on reindeer horn.

**Pradières** (Ariège)

Cavern near Tarascon.

**Reference:** Cartailhac, *Anthr.*, xxi, 149–150 (1910).

**Mural Art:** Spots in red.

**Raymonden** (Dordogne)

Rock shelter in the commune of Chancelade, 7 km. northwest of Périgueux.

**References:** Féaux, *Bull. Soc. arch. et hist. Périgord*, 42 (1875); Breuil, *REA*, xv, 154–155 (1905).

**Portable Art** (Magdalenian): Engraved batons; bone button with figure of mammoth engraved on each side; figures of *Homo* and *Bison* or (*Ovibos?*) on bone (see Fig. 137); figures of horse on reindeer horn and bone; a mammoth on a bone point; Cervidae; hind; bird.

### Rebières, Les (Dordogne)

Rock shelter of Les Rebières II, or Durand-Ruel.

**Reference:** Pittard, *Anthr.*, xxiii, 307–311 (1912).

**Portable Art:** Engraving of moose on a pebble (Middle Aurignacian).

### Rey (Dordogne)

Cavern in the valley of the Beune, near Les Eyzies.

**References:** Rivière, *AFAS*, ii, 714–717 (Caen, 1894); MacCurdy, *Amer. anthr.*, N.S., xxv, 72–89 (1923).

**Portable Art:** Figures of fish sculptured on ribs, one in the Museum at Saint-Germain (see Fig. 177), the other in Yale University Museum (Middle Magdalenian).

### Rideaux, Les (*see* Lespugue)

### Rivière-de-Tulle

Rock shelter near Lacave.

**Reference:** Viré, *Anthr.*, xx, 273–282 (1909).

**Portable Art:** Anthropomorphic figure engraved on reindeer horn; alphabetiform signs engraved on reindeer horn.

### Roc, Le, or La Grotte du Roc (Charente)

Cave in the commune of Sers.

**Reference:** A. Favraud, *REA*, xviii, 407–423 (1908).

**Portable Art:** Engraved bone.

### Roches, Les (Dordogne)

Rock shelters of Blanchard, Délage, and Labatut in the valley of Les Roches, commune of Sergeac.

**References:** L. Didon, *L'abri Blanchard des Roches*, 45 pp. (Périgueux, 1911); Boule, *Anthr.*, xxv, 230 (1914).

**Portable Art:** Sculptured reindeer horn; engravings; drawings in color, on stone, including *Homo* (vulva and phallus), Cervidae, Equidae, and mammoth.

**Roussignol,** or **Les Pouzats** (Lot)

Cave at Reilhac, near Gramat.

**Reference:** Cartailhac and Boule, *La Grotte de Reilhac, Causses du Lot*, 69 pp. (Lyon, 1889).

**Portable Art:** Sculptured reindeer horn with perforation and suggestion of eye and mouth at one end; engraved bone.

**Sainte-Eulalie** (Lot)

Cavern in the commune of Espagnac-Sainte-Eulalie.
Explored by the Abbé Lemozi.

**Reference:** Lemozi, *BSPF*, xvii, 7 pp. (1920).

**Mural Art:** Engravings of reindeer and horse.

* **Saint-Marcel** (Indre)

Rock shelter and cave on the Creuse, below Argenton.

**Reference:** Breuil, *Anthr.*, xiii, 145–165 (1902).

**Portable Art** (Magdalenian): Galloping reindeer engraved on schist; engraved bone pendant; engraved bone amulet similar to Australian *churinga;* sculptured head of horse on bone.

**Saint-Mihiel** (Meuse)

Rock shelter of La Roche-Plate.

**Reference:** Breuil, *REA*, xv, 150–151 (1905).

**Portable Art:** Fragmentary figure of horse engraved on reindeer horn; head of mammoth and Cervidae engraved on bone point.

**Saut-du-Perron** (Loire)

Station in the commune of Villerest.

**Reference:** S. Reinach, *Répertoire de l'art quaternaire*, 176 (Paris, 1913).

**Portable Art:** Indistinct engravings, communicated by Déchelette.

**Savigné** (*see* **Chaffaud**)

**Solutré** (Saône-et-Loire)

La Vigne de Sève adjoining the Crot du Charnier, near Macon.

**Reference:** Reinach, *Répertoire de l'art quaternaire*, 178 (Paris, 1913).

**Portable Art** (Solutrean): Engraving on bone; figures in relief on stone.

### * Sordes (Landes)

Cave of Duruthy and rock shelter of Dufaure, near Sordes.

**References:** Lartet and Chaplain-Duparc, *Mat.*, 2d ser., ix, 101–167 (1874); Breuil and Dubalen, *REA*, xi, 259 (1901).

**Portable Art** (Magdalenian): About fifty perforated canines, three of *Felis*, the remainder of *Ursus ferox*, decorated with incised designs, geometric for the most part, but including a realistic figure of a fish and one of a seal (Duruthy); engraving of a horse on stone (Dufaure).

### Soucy, or Souci (Dordogne)

Rock shelter in the commune of Lalinde.

**References:** G. de Mortillet, *L'homme*, ii, 731 (1885); *CFG*, 177; Peyrony, *Bull. Soc. hist. et. arch. du Périgord*, 8 pp. (1918).

**Portable Art:** Engravings of bird, Equidae, and Cervidae on stone, bone, and reindeer horn.

### Spugo (Haute-Garonne)

Group of caves at Ganties-les-Bains, near Saint-Martory.
Explored by M. Basset and J. Cazedessus.

**Reference:** Cazedessus, *Gisements préhistoriques de la Spugo à Ganties-les-*Bains (Hte.-Garonne) (Saint-Gaudens, 1923).

**Portable Art** (Magdalenian): Engravings of horse and bison on bone and stone.

### Terme Pialat (Dordogne)

Station near Combe-Capelle.

**Reference:** A. Delugin, *Relief sur pierre Aurignacien à representations humaines* (Périgueux, 1914).

**Art:** Relief figures of *Homo* on a block of limestone (Aurignacian).

### ** Teyjat (Dordogne)

Cavern of La Mairie and rock shelter of Mège.

**References:** Capitan, Breuil, Peyrony, and Bourrinet, *REA*, xvi, 196–212 (1906); *ibid.*, xviii, 153–173, 198–218 (1908);. *ibid.*, xix, 62–76 (1909); Capitan, Breuil, Peyrony, and Bourrinet, *CIA*, i, 498–514 (Geneva, 1912).

**Mural Art** (Middle Magdalenian): Engravings on blocks of stalagmite of *Bos, Bison*, bear, horse, reindeer, red deer (La Mairie) (see Fig. 120).

**Portable Art** (Upper Magdalenian): Herd of reindeer engraved on a wing bone of an eagle (see Fig. 131); head of a horse carved from jet; stylistic engravings on a large rib; animal head with pointed muzzle emphasized by incised lines for mouth; coral amulet cut in the round; limestone lamp with engraving on bottom; engraving of a horse on a sacrum; three horses on a bird bone; three bisons on a bone, two wounded by darts; fish on bone (La Mairie). Engraved baton of staghorn with engravings of mare and foal, hind, eels, swans, and diminutive figures with chamois-head masks (see Fig. 167); stag heads, phallus, seal, etc., engraved on wands of reindeer horn (Mège).

### ** Trois-Frères, Les (Ariège)

Cavern in the commune of Montesquieu-Avantes.

**Reference:** Count Begouen, *AIB*, 303 (1920).

**Mural Art:** More than 400 engravings, two of which (the scorcerer and the lion) are outlined in black (see Fig. 151); they include bear, horse, wild ass, bison, deer, reindeer, wild goat, mammoth, rhinoceros, owl, claviform figures, tectiforms, red and black spots, imprints of the human hand.

**Portable Art:** Engravings on bone and reindeer horn, including a fish on bone.

### ** Tuc d'Audoubert (Ariège)

Cavern in the commune of Montesquieu-Avantes (see Figs. 145 and 146).

**References:** Count Begouen, *CIA*, i, 489–497 (Geneva, 1912); Begouen, *Anthr.* xxiii, 657–665 (1912).

**Mural Art:** Engravings of bison, horse (see Fig. 147), and reindeer (see Fig. 181); signs in color; claviform figures; two bisons modeled in clay of the cavern floor (see Fig. 148); one sketched in the clay but left unfinished; another, a small one, has been removed to the museum at Saint-Germain.

**Portable Art:** Figure of horse and Cervidae with contours cut away.

### Vache, La (Ariège)

Cave in the commune of Alliat, opposite Niaux.

**Reference:** Garrigou, *Grotte de la Vache* (1867).

**Mural Art:** Figures in red, black, and yellow, including stylistic human representations.

**Portable Art** (Magdalenian): Figures of Bovidae and seal on bone.

### Veyrier, Le (Haute-Savoie)

Cave at the foot of the Salève.

**Reference:** Breuil, *CIA*, i, 228 (Geneva, 1912).

**Portable Art** (Upper Magdalenian): Baton with engraving of plant on one side and wild goat on the other (see Fig. 178).

### Zouzette, La (Haute-Marne)

Cavern near Farincourt.

**Reference:** A. Bouillerot, *Bull. Soc. agric., sci., et arts de la Haute-Saône*, vi, 13, and vii, 29.

**Portable Art:** Engraving on stone.

## GERMANY

### Andernach (Rhine)

Loess station in Martinsberg.

**Reference:** Wiegers, *PZ*, i, 18 (1909).

**Portable Art** (Magdalenian): Base of staghorn carved to represent a bird (see Fig. 176).

### Klause (Bavaria)

Several caves near Neu-Essing.

**Reference:** Obermaier, *Anthr.*, xxv, 254–263 (1914).

**Portable Art** (Upper Magdalenian): Number of stone plaques (lithographic colored); engraving of mammoth on ivory.

### Mainz (Hesse)

Loess station under a Roman *castellum* within the city limits. Discovered by Otto Schmidtgen in 1922.

**Portable Art** (Aurignacian): Lower half of two female statuettes in the style of Brassempouy and Willendorf.

**Obercassel** (Rhine)

Station in diluvial deposits, near Bonn.

**Reference:** Max Verworn, *Die Naturwissenschaften*, II, 645–646 (1914).

**Portable Art:** Bone polisher with head carved to represent that of a rodent, and the back of the flat shaft ornamented with an incised pattern; head of a horse engraved on both sides of a flat piece of bone, with contours cut away.

**Schussenquelle** (Württemberg)

Loess station near Schussenried.

**Reference:** Obermaier, *MV*, 281.

**Portable Art** (Middle Magdalenian): Engraving of reindeer on reindeer horn.

**Wildscheuer** (Nassau)

Cave at Steeten an der Lahn.

**Reference:** *DVD*, Pl. xxxv.

**Portable Art** (Upper Aurignacian): Chevrons engraved on bird bone.

## HUNGARY

**Jankovics** (Bükk Mountains)

Cave near Esztergom.

**Reference:** Hillebrand, *WPZ.* vi, 14–39 (1919).

**Portable Art:** Stylistic animal head of stone; decorated amulet of ivory.

## ITALY

*** Barma Grande** (Liguria)

Cave in the commune of Grimaldi, near Mentone.

**References:** Reinach, *Anthr.*, ix, 26–31 (1898); Piette, *BMSA*, 5th ser., iii, 773–779 (1902).

**Portable Art:** Five human female figurines of crystalline talc (bushman type) (see Figs. 163 and 164) also a negroid head and a male figurine.

### Romanelli (Otranto)

Cave near Castro.

**References:** Mocchi, *CIA*, i, 267–268 (Geneva, 1912); G. A. Blanc, *AAE*, 1, 65–103 (1920).

**Mural Art:** Many engraved figures of birds, also one of the horse.

## POLAND

### Maszycka (Galicia)

Cavern on the left bank of the Pradnik, near Krakau.

**Reference:** Hoernes, *DME*, 175–178.

**Portable Art** (Magdalenian): Stylistic patterns on bone implements.

### Wierzchow (Galicia)

Caverns in the Rudava valley, near Krakau; the lower is also known as the Cavern of the Mammoth.

**References:** Zavisza, *MSA*, 2d ser., i, 439–447 (1873); Zavisza, *CIA*, i, 69–75 (Stockholm, 1874).

**Portable Art:** Engraving of fish on reindeer horn; ivory ornaments.

## RUSSIA

### Cyrill Street, Kief (Ukraine)

Loess station in the city of Kief.

**Reference:** Obermaier, *MV*, 315.

**Portable Art:** Engravings on the tip of a mammoth tusk.

### Mezine (Ukraine)

Loess station on the Desna near the village of Mezine (Gov. of Chernigov).

**References:** Th. Volkov, *CIA*, i, 415–428 (Geneva, 1912); Levko Tchikalenko, *Etude sur l'evolution de l'ornement géométrique à l'Epoque Paléolithique*, Doctor's Dissertation, Publ. of the Ukrainian University at Prague, 49 pp. (Govt. Printing Press, Prague, 1923).

**Portable Art** (Upper Aurignacian or perhaps Magdalenian): Ornaments carved from ivory (meanders and bird); stylistic figures in the round, probably phallic.

## SPAIN

### Aguas de Novales, Las (Santander)

Cavern 14 km. (8.75 mi.) from Torre la Vega.

**Reference:** *CRC*, 46–48, pls. xxxi–xxxii.

**Mural Art:** Frescoes of bison; signs.

### * Albarracin (Teruel)

Rock shelters and caves known locally as *Los Toricos*, on the left bank of the Guadalquiver; Fuente del Cabrerizo, El Navazo, and Callejon del Plou.

**References:** Breuil and Cabré, *Anthr.*, xxii, 641–648 (1911); Cabré, *CIPP*, No. 1, 180–187 (1915).

**Mural Art:** Paintings of *Bos* and *Homo;* engravings of Equus and *Cervus elaphus.*

### * Alpera (Albacete)

Two caves: La Vieja and El Queso.

**References:** Breuil, Gomez, and Cabré, *Anthr.*, xxiii, 529–561 (1912); Cabré, *CIPP*, No. 1, 187–205 (1915).

**Mural Art:** Frescoes, chiefly of hunting scenes. (*a*) La Vieja; stag, wild goat, *Bos*, *Canis*, hunters, women in the fashion of Cogul. (*b*) El Queso: elk, wild goat, hunter. The oldest figures are in red, as at Cantos de la Visera.

### ** Altamira (Santander)

Cavern near Santillana del Mar.

**References:** Cartailhac, *Anthr.*, xiii, 348–354 (1902); *CA*, viii + 287 pp., 37 pls.; *CRC*, 194–204, pls. xci–c.

**Mural Art:** Engravings, drawings in color, and frescoes of bison, horse, red deer, Capridae, *Bos*, wild boar, chamois, Cervidae, *Elephas;* the first discovery of Paleolithic mural art. The principal group forms a great panel on the ceiling of the left chamber near the entrance (the figures vary in length from 1.5 to 2.5 m.); claviform signs (see Figs. 7, 110 and 113).

**Portable Art:** Engravings on bone and staghorn (chamois, hind) (see Fig. 112).

### Arco, El (Cadiz)

Cave in the Peñon del Tajo de las Figuras, near the cave of Tajo de las Figuras, region of Laguna de la Janda.

**Reference:** Cabré and Hernandez-Pacheco, *CIPP*, No. 3, 27–28, pls. iii–iv (1914).

**Mural Art:** Figures in red of *Homo*, Cervidae, Bovidae, etc.; signs in red, composed of points and straight and wavy lines.

### Ardales (*see* Doña Trinidad)

### Atapuerca, La (Burgos)

Cave east of the city of Burgos, near Ybeas.

**Reference:** Breuil and Obermaier, *Anthr.*, xxiv, 5–8 (1913).

**Mural Art:** Signs in color.

### Barranco de Valltorta (*see* Valltorta)

### Batuecas, Las (Salamanca)

Series of caves and rock shelters in the Batuecas valley.

**References:** Breuil, *R. Arch.*, xix, 224–225 (1912); Breuil, *Anthr.* xxix, 2–27 (1918–19).

**Mural Art** (referred by Breuil to the Azilian Epoch):

I. Canchal de las cabras Pintadas—many figures in red, brown, and white of wild goat, fish, stag, and man
II. Canchales del Christo (three stations)—figures in bright red and dark red
III. Canchal de Mahoma—figures in red, yellow, and white
IV. Canchales de la Pizarra—various figures of animals in red and brown (wild goat, Bovidae, lynx, *Homo*)
V. Canchales del Zarzalon (rock shelter and cave)—stylistic human and other figures

### Bolao (Oviedo)

Cave 2 km. (1.25 mi.) from Llanes, and also near Bolao.

**Reference:** Breuil and Obermaier, *Anthr.*, xxv, 236 (1914).

**Mural Art:** Tectiform signs in red.

**Buxu, El** (Asturias)

Cave in the region of Cangas de Onis.

**Reference:** Obermaier and Count de la Vega del Sella, *CIPP*, No. 20, 42 pp. (1918).

**Mural Art:** Engravings and frescoes of horse, red deer, mountain goat, bison, *Cervus dama*.

**Cala, La** (Malaga)

Cave between Malaga and Palo.

**Reference:** Breuil, *Anthr.*, xxxi, 250–253 (1921).

**Mural Art:** Paintings (indistinct), probably late Paleolithic.

* **Calapatá** (Teruel)

Rock shelter known locally as Roca del Moro, in the valley of the Ebro, near Cretas.

**Reference:** Breuil and Cabré, *Anthr.*, xx, 1–8 (1909).

**Mural Art:** Figures of game animals in red and black on the rock surfaces (stag, wild goat, *Bos*).

**Camargo,** or **Peña del Mazo** (Santander

Cave at Revilla-Camargo.

**Reference:** *MV*, 163, 212, 342.

**Mural Art:** Engravings (Magdalenian).

* **Cantos de la Visera** (*see* **Monte Arabi**)

**Carasoles del Bosque, Los** (Albacete)

Rock shelter near Alpera.

**Reference:** Breuil, *Anthr.*, xxvi, 329–331 (1915).

**Mural Art:** Stylistic paintings of men and animals.

** **Castillo** (Santander)

Cavern near Puente Viesgo (see Fig. 5).

**Reference:** *CRC*, 112–193, pls. lix–xc.

**Mural Art:** Frescoes, drawings, and engravings of bison (see Fig. 142), horse, *Bos*, red deer (see Fig. 112), chamois, wild goat, Capridae, *Elephas* (see Fig. 116); figures of human hand in red (see Fig. 169); tectiform signs; claviform signs.

**Portable Art:** Engravings of red deer on bone and staghorn.

### * Charco del Agua Amarga, El (Teruel)

Cavern in valley of Charco del Agua Amarga.

**References:** Cabré, *CIPP*, No. 1, 152–170 (1915); *HF*, 240.

**Mural Art:** Painted figures of *Homo*, including females in the style of Cogul, *Bos*, Cervidae, *Sus*, *Cervus elaphus*.

### Chiquita de los Trenta (Almeria)

Cave near Chirivel.

**Reference:** Breuil and F. de Motos, *Anthr.*, xxvi, 332–336 (1915).

**Mural Art:** Painted figures of the stag, man, etc.

### Clotilde, La (Santander)

Cavern near Santa Isabel.

**Reference:** *CRC*, 40–46, pls. xxix–xxx.

**Art:** Animal figures of *Bos* (see Fig. 150) traced in clay (probably Aurignacian).

### * Cogul (Lerida)

Rock shelter in the Ebro valley, 18 km. (11.25 mi.) south of Lerida.

**Reference:** Breuil and Cabré, *Anthr.*, xx, 8–21 (1909).

**Mural Art:** Figures in black and red of men and women, the latter in skirts (see Fig. 138); *Bison*, *Bos*, and Cervidae.

### Cortijo de los Treinta, El (Almeria)

Cave about 15 km. (9.4 mi.) from Velez Blanco.

**Reference:** Cabré, *CIPP*, No. 1, 217 (1915).

**Mural Art:** Animal figures in color (stag, wild goat); stylistic human figures.

**Coto de la Zarza, El** (near boundary between Almeria and Granada)

Rock shelter 5 km. (3.1 mi.) from Topares.

**Reference:** Cabré, *CIPP*, No. 1, 219–220 (1915).

**Mural Art:** Figure of mountain goat in color.

* **Covalanas** (Santander)

Cavern near Ramales.

**Reference:** *CRC*, 14–22, pls. iv–xvii.

**Mural Art:** Paintings (hind, horse, *Bos*) and signs.

**Cueto de la Mina** (Asturias)

Cavern near Posada.

**Reference:** Count de la Vega del Sella, *CIPP*, No. 13, 94 pp. (1916).

**Mural Art:** Incised lines.

**Portable Art:** Engraved batons.

**Doña Trinidad** (Malaga)

Cavern near Alora, between Carratraca and Ardales.

**Reference:** Breuil, *Anthr.*, xxxi, 239–250 (1921).

**Mural Art:** Engraved and painted Paleolithic figures of animals, chiefly the horse and hind.

**Estrecho de Santonje** (Almeria)

Three caves near Velez Blanco.

**Reference:** Breuil, *Anthr.*, xxvi, 335 (1915).

**Mural Art:** Paintings of the stag.

**Garcibuey** (Salamanca)

Small cave near the village of Garcibuey.

**References:** Breuil, *Anthr.*, xxiii, 18 (1912); *ibid.*, xxix, 25–27 (1918–19).

**Mural Art:** Stylistic human figures in red; various signs.

**Grajas, Las** (Granada)

Cave near Almasiles.

**Reference:** Breuil and de Motos, *Anthr.*, xxvi, 332–336 (1915).

**Mural Art:** Painted figure of the goat.

**Haza, La** (Santander)

Cave near Ramales.

**Reference:** *CRC*, 11–14, pls. xviii–xxi.

**Mural Art:** Figures of the horse, etc., in color.

**Herrerias, Las** (Oviedo)

Cave about 3 km. (1.9 mi.) south of Llanes, also known as Volado.

**Reference:** Hernandez-Pacheco, *CIPP*, No. 24, 25 (1919).

**Mural Art:** Painted signs.

* **Hornos de la Peña** (Santander)

Cavern in the region of San Felices de Vuelna.

**Reference:** *CRC*, 85–111, pls. l–lviii.

**Mural Art:** Paintings and engravings of the horse, bison, *Bos*, wild goat, red deer; indistinct primitive mural animal figures and signs traced in the clay.

**Portable Art:** Horse engraved on the frontal bone of a horse (Aurignacian); spirals engraved on deerhorn (Magdalenian).

**Jiména** (Jaén)

Cave known locally as La Graja, near Jiména.

**Reference:** Gomez Moreno, *Institut d'Estudis Catalans*, 89–103 (1908); *HF*, 329–330, pl. 19.

**Mural Art:** Stylistic human figures in color.

**Lavaderos de Tello,** or **Desfiladero de Leira** (Almeria)

Rock shelter some 24 km. (15 mi.) from Velez Blanco.

**References:** Breuil and Obermaier, *Anthr.*, xxv, 239–242 (1914); Cabré, *CIPP*, No. 1, 218 (1915).

**Mural Art:** Figures of the stag in red; stylistic figures of men.

**Loja, La** (Oviedo)

Cave in the district of Panes, near Buelles.

**Reference:** *CRC*, 53–59.

**Mural Art:** Engravings of *Bos*.

**Meaza** (Santander)

Cave near Comillas.

**Reference:** *CRC*, 51–52.

**Mural Art:** Enigmatic figures composed of red spots.

**Minateda** (Albacete)

Great rock shelter near the village of Minateda.

**Reference:** Breuil, *Anthr.*, xxx, 1–50 (1920).

**Mural Art:** Thirteen superposed layers of frescoes, as follows, beginning with the oldest:

1. Small crude figures in bright red and brown, often stylistic, of man and animals
2. Large figures in bright red of man and animals
3. Figures in black or red of man and animals
4. Large figures in red of man and animals, analogous to the ancient Magdalenian of the Cantabrian Pyrenees
5. Small figures outlined in black of man and animals; large figures in black or brown of man
6. Brown and reddish brown human and animal figures shaded by means of lines approximately parallel
7. Figures partially filled in by means of flat color and parallel lines
8. Reddish-brown figures
9. Polychrome animal figures

The figures, for the most part stylistic, include *Homo*, red deer, rhinoceros, wild goat, bird (goose and crane), horse, wild boar, reindeer, chamois, saiga, fish, fallow deer, *Bos*.

10. Animal figures in brown and well formed human figures in dark brown
11. Human and animal figures in deep brown or black
12. Human and animal figures in black, brown, or red, clearly in the stage of degeneration
13. Stylistic human and animal figures in black or reddish brown

### * Monte Arabi (Murcia)

Rock shelters near Yecla known as Cantos de la Visera, and caves.

**References:** Breuil and Burkitt, *Anthr.*, xxvi, 313–328 (1915); Cabré, *CIPP*, No. 1, pp. 208–216 (1915).

**Mural Art:**

I. Cantos de la Visera: small shelter with 43 figures—7 horses, 4 deer, 4 hinds, 6 oxen, 4 wild goats, etc.
II. Cantos de la Visera: large shelter with some 73 figures—stag, hind, horse, wild goat, man, bird, etc.
III. Cave of the Mediodia: three panels of stylistic painted figures

### Negra (Albacete)

Rock shelter near Almansa.

**Reference:** Breuil and Burkitt, *Anthr.*, xxvi, 324 (1915).

**Mural Art:** Stylistic animal figures in color.

### Paloma, La (Cadiz)

Cave near Facinas y Casas Viejas.

**References:** Cabré, *CIPP*, No. 1, 208 (1915); Hernandez-Pacheco, *ibid.*, Mem. No. 31, 38 pp. (1923).

**Portable Art:** Figures of horse and hind on slate and bone (Middle Magdalenian).

### Parpallo, El (Valencia)

Cave near Gandia.

**Reference:** Breuil and Obermaier, *Anthr.*, xxv, 251 (1914).

**Portable Art:** Calcareous plaque with engraving of the head of an animal.

### ** Pasiega, La (Santander)

Cavern near Puente Viesgo.

**Reference:** *PP*, 64 pp., 29 pls.

**Mural Art:** Engravings and paintings of horse, red deer, bison, *Bos*, wild goat, chamois, *Elephas;* tectiform signs in red; claviforms; alphabetiform signs.

*** Peña de Candamo, La** (Asturias)

Cavern in El Cerro de la Peña, near San Roman de Candamo.

**Reference:** Hernandez-Pacheco, *CIPP*, No. 24, 281 pp. (1919).

**Mural Art:** Many drawings and paintings in color (probably Middle Magdalenian).

**Peña** (or Piedra) **Escrita de Fuencaliente** (Ciudad Real)

Rock shelters at Fuencaliente.

**Reference:** *HF*, 331–332.

**Mural Art:** Stylistic human figures in color.

**Penches** (Burgos)

Cave on the Rio Penches.

**Reference:** Hernandez-Pacheco, *CIPP*, No. 17, 34 pp. (1917).

**Mural Art:** Engravings and paintings (Magdalenian).

**Pendo, El** (Santander)

Cavern in the district of Escobedo-Camargo.

**Reference:** *CRC*, 35–39, pls. xxii, xxviii.

**Mural Art:** Figures of penguins engraved on cavern wall.

**Peñon de la Tabla de Pochico** (Jaén)

Rock shelter some 3 km. (1.9 mi.) from Aldeaquemada.

**Reference:** Cabré, *CIPP*, No. 1, 220–221 (1915).

**Mural Art:** Figures in red of game animals; stylistic human figures (the latter probably Neolithic).

**** Pileta, La** (Malaga)

Cavern about midway between Benaojan and Jimera.

**Reference:** *PB*, 62 pp. 21 pls.

**Mural Art:** Engravings and paintings (Paleolithic and post-Paleolithic). Breuil noted a superposition of black on red and red on yellow. Figures of the horse, wild goat, hind, *Bos*, bison, *Homo* in color; engraved figures of the fish; serpentiforms and tectiforms.

### * Pindal (Asturias)

Cavern in the district of Riba-de-Deva (see Fig. 182).

**Reference:** *CRC*, 59–81, pls. xxxiii–xlvi.

**Mural Art:** Paintings, symbols including club-shaped figures, five of which accompany the figure of a wounded bison (see Fig. 183); drawings in red and black of the horse, bison, stag, *Elephas*, hind; engravings of a Spanish mackerel, bison, horse; bison partially engraved and partly polychrome.

### Prado del Azogue, El (Jaén)

Rock shelter near Aldeaquemada.

**Reference:** Cabré, *CIPP*, No. 1, 221–222 (1915).

**Mural Art:** Figures of the wild goat in color.

### Pretina, or Los Ladornes (Cadiz)

Cave in Casas Viejas, Sierra de las Momias.

**Reference:** Cabré, *CIPP*, No. 1, 222–223 (1915).

**Mural Art:** Paintings in red.

### Quintanal (Oviedo)

Cave near Balmori, Llanes.

**References:** *CRC*, 83–84; Hernandez-Pacheco, *CIPP*, No. 24, 25 (1919).

**Art:** Wild boar outlined in clay.

### Salitré (Santander)

Cavern near Ajanedo-Miera.

**Reference:** *CRC*, 23–26.

**Mural Art:** Figures in red of the hind.

### San Antonio (Oviedo)

Cave near Riba de Sella.

**Reference:** Breuil and Obermaier, *Anthr.*, xxv, 237 (1914).

**Mural Art:** Small figure of horse in black.

**San Garcia** (Burgos)

Cave near Santo Domingo de Silvos.

**Reference:** Breuil and Obermaier, *Anthr.*, xxiv (1913).

**Mural Art:** Human silhouettes; stylistic animal figures; geometric patterns (probably Neolithic); horse and *Homo* traced in clay.

* **Santian** (Santander)

Cavern near Puente-Arce.

**Reference:** *CRC*, 26–35, pls. xxi–xxvii.

**Mural Art:** Figures in red, some resembling the human hand.

**Sotarriza, La** (Santander)

Cavern near Molinar de Carranza and adjacent to another cave known as Cova Negra.

**Reference:** *CRC*, 8–9.

**Mural Art:** Figure in black of horse.

**Tajo de las Figuras, El** (Cadiz)

Cave at Casas Viejas in the Peñon del Tajo de las Figuras, near the Laguna de la Janda.

**References:** Cabré and Hernandez-Pacheco, *CIPP*, No. 3 (1914); Breuil, *Anthr.*, xxx, 157 (1920).

**Mural Art:** Paintings; stylistic figures of birds, *Homo*, Cervidae, etc. (Neolithic).

**Tortosillas** (Valencia)

Rock shelter near Ayora.

**Reference:** Breuil, Gomez, and Cabré, *Anthr.*, xxiii, 561 (1912).

**Mural Art:** Hunting scene (red deer, chamois, *Homo*).

**Valle** (Santander)

Cave near Rasines.

**Reference:** *HF*, 170–171.

**Portable Art:** Baton of staghorn with engraving of a hind; figures of horse and heads of stag engraved on bird bone.

*** Valltorta, Barranco de** (Castellón)

Rock shelters and caves near Albocacer: El Civil, El Arco; Tolls, Rull, Mas d'en Josep, and Los Caballos.

**Reference:** Obermaier and Wernert, *CIPP*, No. 23, 134 pp., 26 pls. (1919).

**Mural Art:** Paintings representing hunting scenes.

**Velez Blanco** (*see* **Estrecho de Santonje**)

**Venta de la Perra** (Santander)

Cave near Santona.

**Reference:** *CRC*, 2–8.

**Mural Art:** Engraved animal figures (bear, bison) and signs.

## SWITZERLAND

**Freudental** (Schaffhausen)

Cave near Schweizersbild.

**Reference:** *MV*, Fig. 178.

**Portable Art:** Bone points with geometric ornament.

*** Kesslerloch** (Schaffhausen)

Cave near Thaingen.

**Reference:** *APAR*, vi, xxx; *DVD*, pls. xxxi–xxxii.

**Portable Art:** Batons with engravings of browsing reindeer, horse, etc.; incised figures of horse and woolly rhinoceros (?); head and shoulders of musk ox in the round; decorated dart throwers (see Fig. 128). Originals in Rosgarten Museum, Constance (Bavaria).

**Schweizersbild** (Schaffhausen)

Rock shelter near Schaffhausen.

**Reference:** Nüesch, *DASGN*, xxxv (1896); Nüesch, *NDSNG* (1902).

**Portable Art:** Engravings of Equidae on reindeer horn and stone (Middle Magdalenian).

# APPENDIX III

## ON THE PRESERVATION OF PREHISTORIC MONUMENTS

*France.*—The motives which prompted early man to choose certain sites for his abode rather than others cannot be gauged with certainty. Considerations of safety were presumably among the strongest, as were also proximity to water and the food supply. Comfort and appeal to the æsthetic sense were possibly of secondary importance.

Among the earliest prolonged dwelling places that have been preserved to us are the natural caves and rock shelters, the habitation of some of which date as far back as the beginning of the Mousterian Epoch or perhaps even the Acheulian Epoch. Some of these were inhabited intermittently for tens of thousands of years before the dawn of history; the more nearly they combined the elements that met the requirements of safety and proximity to food and drink, as well as comfort, the longer and more continuously they were occupied.

It may be a mere chance that some of these prehistoric dwelling places most favored by man's presence over vast periods of time are likewise beautiful as to situation and sightly in themselves. Witness, for example, Placard in Charente; Le Moustier, La Madeleine, Laugerie-Haute, Laugerie-Basse, the Abri du Château, and Lausse1 to mention only a few in the Vézère valley; and Mas d'Azil, Niaux, Tuc d'Audoubert and Trois-Frères in Ariège. More constant, however, than beauty of situation is the presence of a water supply: a spring, a perennial brook, or a river.

The most potent factor in determining whether a certain cave or rock shelter should be marked for preservation is the human interest attaching thereto. Happily there exists in France the necessary administrative machinery for the preservation of worth-while monuments, both historic and prehistoric. The financial means for obtaining the desired results are however just now inadequate.

The law provides for the classification, or setting aside, of any real property (*immeuble*) to which attaches public interest from the viewpoint of history, prehistory, or art. Such classification is by the decree of the *Ministre de l'Instruction Publique et des Beaux-Arts.* In case of failure to come to agreement with the owner, the Council of State

may take action by right of eminent domain; the owner is paid for any damages he may have suffered by reason of the classification.

The work of conservation is in the hands of a Commission presided over by the *Ministre de l'Instruction Publique et des Beaux-Arts.* The Commission is composed of three sections: (1) historic monuments; (2) prehistoric monuments; and (3) antiquities and art objects. With the exception of plenary meetings of the Commission, each section is master of its own deliberations and reports directly to the Ministry. The section in charge of prehistoric monuments is limited to fifteen members, of which ten are members *ex officiis.* Each section of the Commission directs its own supervisors stationed in the various departments of which France is composed. In some departments the Commission is represented by two supervisors—one for the historic monuments and one for the prehistoric. In others there is a supervisor for but one class of monuments. Sometimes the two offices are combined. Still other departments are without local supervision which is cared for by some member of the Commission. The supervisors are called *Delégués du Ministère de l'Instruction Publique et des Beaux-Arts.* Each has charge of the *monuments classés* in his own field.

The classified prehistoric monuments in France belong to two categories: those owned outright by the Government, and those over which the Government has at least partial control. As soon as a privately-owned prehistoric site is classed by the State, that is, becomes a *monument classé,* the owner is no longer in complete control; for the State requires that the place be open to the public for at least part of the time. On account of this requirement, the wonderful series of caverns in Montesquieu-Avantes (Ariège) known as Tuc d'Audoubert, Enlène, and Trois-Frères are not yet classed as national monuments. Count Begouen, the present owner, has taken all necessary steps to protect and preserve to posterity these priceless monuments that have come down to our time through countless ages; but he prefers to limit the visitors to those only who are interested seriously in the records the caverns reveal; and these records will be safe as long as he and his three sons, the Trois-Frères, live.

With the realization of the importance of stratigraphy, or culture sequence, as the proper basis for the science of prehistory, the desirability, even the necessity of saving *in situ* a section of the culture deposits became self-evident. Such a section could be made not only to serve as an object lesson for future students, but also as a gauge by which to determine the accuracy of the original explorer of the site in question. In the earlier years the life history of many a station

of supreme value was completely extinguished by the pick and shovel of the undiscerning searcher after specimens; or even of those of pioneers gifted beyond the average, but handicapped by ignorance of the true significance of the phenomena they were uncovering.

What a pity it is, for example, that Cro-Magnon had to be discovered in 1868 instead of 1921. It is now an empty shell of a rock shelter by the roadside and back of a dwelling. The evidence by which one might have determined the exact age of the skeletons found there has vanished beyond recall; and we shall never be quite sure to which phase of the Upper Paleolithic they belong. No trace of any of the deposits is left, and as a site Cro-Magnon is but a memory.

Placard in Charente is another example of the sacrifice of a station of great importance. The interior of the cave was emptied at an early date, rather hurriedly and under absentee supervision. One can still find valuable specimens by digging in the refuse heap. Such matters are managed differently now although of course no effort is made to preserve sites that are relatively insignificant.

There are two classes of Paleolithic stations that are well worth while: (1) those with mural art, and (2) those which have superposed culture-bearing deposits representing more than one epoch, or a succession of hearths belonging to various phases of the same epoch. Among the foremost examples of the first class are: Font-de-Gaume, Combarelles, La Mouthe, La Mairie, and Cap Blanc in Dordogne; Niaux, Marsoulas, Tuc d'Audoubert, and Trois-Frères in Ariège; and Gargas in Hautes-Pyrénées. The preservation of these sites is easy with the exception of Cap Blanc; for they are subterranean caverns, accessible through a small entrance which can be closed with but little expense. Tuc d'Audoubert and Trois-Frères are both so difficult of access that even a closed gate would seem to be a superfluity. It is fortunate that almost everywhere the caves are protected automatically by local taboo born of mystery and legend. Once a gateway is established, a caretaker, usually some one living near-by, has the key and the lighting facilities and accompanies all visitors.

At Cap Blanc the mural art in the form of several figures of the horse in low relief and almost life size, are on the wall of a rock shelter. They had been protected through the ages alike from the elements and vandal hands by a formation of talus until their discovery about 1910. Immediately thereafter a solidly built stone lean-to was erected which affords ample protection for the relief figures and for a cast of the human skeleton found there.

Stations with superposed culture-bearing deposits have not fared

so well as have those containing mural art. These deposits are usually at the base of overhanging rocks or just outside the entrance to caves. The problem of future protection thus at once becomes a more difficult one. Mere enclosure with gateway, lock, and key will not suffice; there must also be a roof. Happily, such difficulties are not insurmountable and are being met in a number of instances, notably at Le Moustier, Laugerie-Basse and Marseilles, the Abri du Château at Les Eyzies, and La Ferrassie, to mention Dordogne alone.

The site that has been preserved at Le Moustier is the lower rock shelter where Hauser found a Neandertal skeleton in 1908. The State has placed a roof over the carefully prepared section and the entire shelter is surrounded by a fence with gate.

The site at Les Eyzies known as the Abri du Château, has had an eventful history. Twice it was inhabited for a considerable period of time by Magdalenian man. Then in the eleventh century A.D., after a lapse of many thousands of years, the foundations of a beautiful château were begun. Signs of the two previous occupations were destroyed until the builders came to a great block of fallen stone. This they left untouched and with it the hidden deposits beneath. Centuries passed and the château itself became a ruin. Other centuries came and with them the need of a Government Paleolithic museum at Les Eyzies. For this purpose the old château was chosen and in part restored. The château museum which is now open to the public, contains collections from various Dordogne sites in addition to a synoptic collection. The most important of its exhibits however is the carefully prepared section under the great fallen rock, representing *in situ* two distinct levels of Magdalenian occupation. In a case of the museum proper is a series of specimens including an engraving on bone of more than passing significance, also batons and harpoons of reindeer horn, found by Peyrony while preparing the section. In the Abri du Château we have a happy combination of the historic and prehistoric national monuments (see Fig. 4).

The double station of Laugerie-Basse and Les Marseilles include not only a section of relic-bearing deposits but also a museum; the latter however is a simple modern building constructed for the purpose by Monsieur Le Bel who owns the two prehistoric sites in question (see Fig. 155). Like the Abri du Château, the two rock shelters at Laugerie-Basse are beautiful for situation, and there are never-failing springs at all three. The classic station of Laugerie-Basse is widely known because of the portable art objects found there, comprising a reindeer carved on the handle of a poniard of reindeer horn; a female

figurine in ivory; engraving on schist, known as the "combat de rennes"; the "femme au renne"; the man chasing a wild ox, and many other examples. A Magdalenian human skeleton was likewise found there many years ago. The antiquities from Laugerie-Basse are for the most part in the national museum at Saint-Germain.

The rock shelter of Marseilles at Laugerie-Basse was only recently explored. The principal collections from it are in the adjoining museum and in the private collection of Monsieur Le Bel in Paris. Back of and above Marseilles is a cavern some 25 meters deep, which served as a refuge in Magdalenian times. The two stations are already classified as national monuments and it is understood that the present owner will eventually give them as well as his collections to the Government.

La Ferrassie exhibits one of the most important series of superposed deposits ever discovered. The greater part of the deposits of this rock shelter have already been removed by Capitan and Peyrony, who have worked there intermittently since 1898. Among their finds are to be mentioned several Mousterian skeletons; objects of portable art and industrial remains belonging to various epochs. A section showing ten horizons has been carefully prepared by Peyrony, but the construction of a protecting roof will probably not be undertaken until the Government obtains title to the station by right of eminent domain and places it on the classified list.[1]

Of the prehistoric monuments thus far classified, the so-called megalithic monuments outnumber all the others combined; these include dolmens of every description, tumuli, menhirs, cromlechs, and alinements. A classified monument may consist of a single site, structure, or specimen; or it may consist of a group of the same, depending upon circumstances. Of the 490 classified prehistoric monuments, 413 are of the megalithic class. The remaining 77 come under the following heads: caves, 18; rock shelters, 7; stations without more definite designation, 10; camps, 5; fortifications, 4; lake dwellings, 1; sepultures, 2; polishing stones, 19; stones with cupules, 7; sculptured erratic blocks, 1; various, 3.

The 490 classified prehistoric monuments are distributed over 76 of the 86 departments comprising France. The most favored departments are Morbihan and Finistère in Brittany with their wealth of megaliths. The next in point of numbers and perhaps first in importance, is Dordogne. It will be noted that the Government has not yet succeeded in setting aside a single sand, loess, and gravel pit. Plans

[1] Purchased in 1922 for Capitan, who will eventually give it to the Government.

for rendering effective any classification of this sort seem to be beset by unusual difficulties.

*Denmark.*—The enactment of laws in Denmark for the protection of prehistoric monuments, and the control and disposition of museum collections is due to the wide-spread interest created by the excellence of the work done in prehistory for more than a hundred years. The best of the megalithic and other prehistoric monuments, including kitchen middens, to the number of over four thousand now belong to the State, having been either purchased or received as gifts.

There is a museum system in force since 1880, which closely binds the ten or more provincial museums with the National Museum at Copenhagen. The provincial museums each receive a small annual subsidy from the State; in return for this, they may be called upon at any time to relinquish important specimens that may be wanted for the national collection at Copenhagen. The Director of the National Museum is *ex officio* advisory director of all the provincial museums and visits them annually. The provincial museums are not allowed to carry on excavations without a permit from the National Museum authorities.

Antiquities of gold and silver found in Denmark are treated as a class apart. They must become the property of the State, which pays the finder a sum equal to their intrinsic value, to which a small bonus is added; the object of the bonus is to lessen the temptation to sell to a purchaser other than the State, or even to melt down precious relics for the mere value of the metal they contain.

*England.*—The problem of preserving historic and prehistoric monuments in England is left in the hands of the Board of Public Works. Much has already been done in the way of setting aside historic monuments. On the other hand, the scheduling of prehistoric sites as ancient monuments has hardly more than begun. The list of scheduled prehistoric monuments includes the following:

(1) The well-known stone circle of Stonehenge (Bronze Age) in Wiltshire.

(2) The Neolithic stone circle of Arbor Low five miles from Bakewell in Derbyshire.

(3) The long barrow known as Wayland's Smithy in Berkshire.

(4) The Neolithic flint quarries at Cissbury near Worthing, Sussex.

Efforts are being made to schedule as an ancient monument the

flint quarries known as Grime's Graves near Weeting (Norfolk) and to leave the care of them to some near-by local society or museum. Recent excavations at Grime's Graves by A. L. Armstrong and others reveal an interesting culture sequence.

*Germany.*—Each province in Germany has its own rules in regard to the preservation of prehistoric monuments. As a rule treasure trove belongs to the State rather than to the private owner of the land. In Württemberg, the Stuttgart Museum and the *Urgeschichtliches Forschungsinstitut* at Tübingen alone have the right to dig on public lands. Before digging on private property, one must first secure the permission of the owner.

List of Classified Prehistoric Monuments in France

(*Corrected to January, 1922*)

| | |
|---|---|
| **Ain:** | |
| *Simandre-sur-Suron* | Menhir: "Pierre-Fiche" |
| *Bragnier-Cordon* | Grotte de la Bonne-Femme |
| | " " Lievre |
| *Contrevoz* | Prehistoric camp |
| *Bagneux* | Two erratic blocks with cupules at Tous Rosset |
| *Magnière* | Stone with cupules |
| **Aisne:** | |
| *Berzy-le-Sec* | Two polishing stones |
| *Bois-les-Parguy* | Menhir: "le Verziau de Gargantua" |
| *La Bouteille* | " "la Haute Bonde" |
| *Haramont* | " "la Pierre Clouée" |
| *Vic-sur-Aisne* | Allée couverte: "le Clos-Bastard" |
| **Basses-Alpes:** | |
| *Villard-d'Ubaye* | Dolmen |
| **Alpes-Maritimes:** | |
| *Saint-Cezaire* | Dolmen de la Graon |
| *Saint-Vallier de Thiey* | " "Castellaras de la Malle" |
| **Ardèche:** | |
| *Baune* | Dolmen de la Lauze |
| *Beaulieu* | " du Bois des Roches |
| *Bidon* | " de Champnerveil |
| *Bourg St. Anded* | " des Joyandes |
| *St. Albans-sous-Sampzon* | " |
| *St. Remeze* | " de Malbase |

| | |
|---|---|
| **Ariège:** | |
| *Bord-sur-Lez* | Dolmen d'Ayer |
| *Gabre* | " de Coudère |
| *Niaux* | Grotte de Niaux |
| *Mas d'Azil* | Dolmen de Seignas |
| | " " Bedot |
| **Aube:** | |
| *Avant-les-Marcilly* | Menhir: "la Pierre-au-Coq" |
| **Aude:** | |
| *Villeneuve-Minervois* | Dolmen |
| *Malves* | Menhir |
| **Aveyron:** | |
| *Buzeins* | Dolmen |
| *La Cavalerie* | " |
| *Martiel* | " |
| *Montjaux* | " |
| *Saint-Affrique* | " des Tiergues |
| *Salles-la-Source* | " du Genevrier |
| **Bouches-du-Rhône** | |
| *Fontvieille* | Grotte-dolmen des Fées de Cordes |
| | " " de la Source |
| | " " " Bounais |
| | " " du Forgeron |
| | Remains of dolmen of Contiguardes |
| **Calvados:** | |
| *Colombier-sur-Seules* | Menhir |
| *Condé-sur-If* | " : "la Pierre cornue" |
| *Fontenay-le-Marmion* | Tumulus: "la Butte de la Hoque" |
| *Jurques* | Dolmen: "Pierre Dialau" |
| **Cantal** | |
| *Seriers* | Grand dolmen: "la table du Loup" |
| | Menhir: "la Croix grasse" |
| | " "la Pierre Plantade" |
| *Talizat* | " " " " |
| **Charente:** | |
| *Angoulême* | Polishing stone: "le Gros Chail" (in garden of the Hôtel de Ville) |
| *Fontenille* | Dolmen: "la Grosse Pérotte" |
| | " " Petite Pérotte" |
| *Gardes* | Rock shelter of La Quina |

CHARENTE:

| | |
|---|---|
| *Luxé* | Dolmen under tumulus: "la Motte de la Garde" |
| *Le Petit-Lessac* | Dolmen de la Madeleine (converted into a chapel) |
| *Le Placard* | Grotte du Placard |
| *Vervant* | Dolmen de la Boixe |

CHARENTE-INFÉRIEURE:

| | |
|---|---|
| *Ardillères* | Dolmen: "la Pierre Lévee" |
| | " " " Fouquère" |
| *Montguyon* | " " " Folle" |
| *Saint-Laurent de la Prée* | Dolmens (two): "les Pierres closes de Charras" |
| *Périchard* | Camp |

CHER:

| | |
|---|---|
| *Graçay* | Dolmen: "la Pierre levée" |
| *St. Georges-sur-Moulon* | Menhir: "la Pierre à la Femme" |
| *Villeneuve-sur-Cher* | Dolmen: "la Table de la Roche" |

CORRÈZE:

| | |
|---|---|
| *Argentat* | Menhir: "la Grave de Roland" |
| *Aubazine* | Cromlech du Puy de Pauliat |
| *Beynat* | Dolmen: "la Cabane de la Fée" |
| *Espartignac* | " " Maison du Loup" |
| *Saint-Cernin-de-l'Arche* | Menhir de Lapalain |

CORSE:

| | |
|---|---|
| *Belvedere-Campomoro* | Menhir de Capo di Luogo |
| *Grossa* | " du Vaccil-Vecchio |
| *Le Rizzanese* | Menhirs (two) |
| *San Pietro di Tienda* | Dolmen du Monte-Rivinco |
| *Sartène* | " de Fontanaccia |

CÔTE D'OR:

| | |
|---|---|
| *Boufe* | Tumulus du Cracomet |
| *Coulmier-le-Sec* | Menhir |
| *Genay* | " "Grande Borne" |
| *Montigny St. Barthelémy* | " du Cimietière |
| *Nolay* | Dolmen de Champin |
| *La Roche-en-Brénil* | Menhirs (two) |
| *La Rochepot* | Dolmen: "la Pierre qui vire" |
| | Allée couverte de la Chaume |
| *Sussey* | Menhir de la Petite Pointe |
| *Volney* | Dolmen: "la Pierre brulée" |

| | |
|---|---|
| CÔTES-DU-NORD: | |
| *Begard* | Menhir de Kerguézennce |
| *Bourbriac* | Tumulus and dolmen of Danoué a Dou |
| | Dolmen de Kerivoie |
| *Pederuec* | Menhir: "au hameau du Menhir" |
| *Plédran* | Camp de Pérau |
| *Plesidy* | Menhir de Caelonau |
| *Pleslin* | Alinement du Champ des Roches |
| *Pleumeur-Bodou* | Menhir de Saint-Duzec |
| *Ploufragan* | Dolmen de la Couette |
| *Le Quessoy* | " du Champ Grasset |
| *Quintin* | Menhir: "la Roche longue" |
| *Vieux Marché* | Dolmen de la Chapelle des sept-saints |
| CREUSE: | |
| *Blessac* | Dolmen |
| *Champagnat* | Menhir: "la Pierre-femme" |
| *La Serre-Bussière Vieille* | Dolmen |
| *La Souterraine* | Menhir de la Gérafie |
| DORDOGNE | |
| *Bayac* | Station of la Gravatte (Gravette) |
| *Bernifal* | Cave of Bernifal |
| *Bouloureix* | Station of la Tabaterie |
| *Bourdeilles* | Station of Bernou |
| *Bourniquel et Bayac* | " " Champs-Blancs |
| *Brantôme* | Dolmen: "la Pierre levée" |
| *Couze* | Station Couze, near the freight house |
| *Domme* | " and rock shelter of Combe-Granal |
| *Les Eyzies de Tayac* | Cavern of Font-de-Gaume |
| | " " Combarelles |
| | Abri du Château |
| | " " Poisson, at George d'Enfer |
| | " de Laugerie-Haute |
| *Limeuil* | Station of Limeuil |
| *Marquay* | Cap-Blanc (rock shelter frieze) |
| | Cave of La Grèze |
| *Micoque*[2] | Fallen rock shelter |
| *Peyzac* | Rock shelter of Le Moustier (lower one) |
| *Rampieux* | Dolmen: "Peyre Levade" |
| *St. Avit-Lenieur* | Station of Patary |
| *St. Aquilin* | Dolmen de Peyrebrune |
| *St. Léon-sur-Vézère* | Station "Sous-le-Roc" |
| | " "à la Tuilière" |
| *Sergeac* | " "Les Roches de Castel-Merle" |

[2] Listed in 1922.

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|---|---|
| DORDOGNE: | |
| *Teyjat* | Grotte de la Mairie |
| *Vitrac* | Dolmen |
| EURE | |
| *Ambenay* | Dolmen |
| *Dampmesnil* | Allée couverte |
| *Landepeureuse* | Menhir: "la longue Pierre" |
| *Les Ventes* | Dolmen de l'Hôtel Dieux" |
| *Verneusses* | " : "la Grosse Pierre" |
| EURE-ET-LOIR: | |
| *Beschère-sur-Vesgre* | Menhir de la Ville-l'Evêque |
| *Corancez* | Polishing stone: " Pinte de St. Martin" |
| *Saint-Avit* | Dolmen de Quincampoix |
| *Trizay-les-Bonneval* | " : "Pierre de Villebon" |
| *Ymeray* | Menhir: "Chantecocq" |
| FINISTÈRE: | |
| *Berzec Cap-Sizun* | Oppidum Gaulois de Castel-Coz |
| *Camaret* | Alinements |
| *Cleden Cap-Sizun* | Oppidum de Castel-Coz |
| *Commana* | Allée couverte de Mongau |
| *Crozon* | Alinement of Ty-ar-C'hure |
| *Goulven* | Dolmen de Tréguelc huer |
| *Guelven* | " " Costquer |
| *Guerlesquin* | Menhir de Kerellou |
| *Guiclan* | Grotte de Roch Toul |
| *Kermorvan* | Dolmen |
| *Landunvez* | " d'Argenton |
| | Menhir d'Argenton |
| *Le Laz* | " de Kecmez |
| *Penmarc'h* | " |
| | Tumulus sur galerie dolmenique du Poulgney |
| *Plouarzel* | Menhir de Kervéatoux |
| *Plobanalec* | Dolmen de "Manez Goarum Arfeunteny" |
| *Plouescat* | Menhir du Camp-Louir |
| | Dolmen de Creac'h-ar-Vreux |
| *Ploumogner* | Cromlech de Kermorvan |
| *Plounéour-Trez* | Menhir de Pontusval |
| | " " " |
| *Ploivan-Ploudalmezeau* | " " Kercadioux |
| *Plozevet* | " : "les Droits de l'Homme" |
| *St. Pol-de-Léon* | Dolmen de Boutouiller |
| *Ile de Sein* | Menhirs (two): "les Causeurs" |

| | |
|---|---|
| **Gard** | |
| *Aigueze* | Dolmen: "Pie de Monnie" |
| | Cave of Chabot |
| *Barjac* | Group of three dolmens |
| *Calvisson* | Neolithic sepultures of Conte Perdrix |
| *Campestre* | Dolmen: "Peyre de Cabusso Ludo" |
| *Le Garn* | Cave of Ouillins |
| *Lussan* | Menhir: "la Pierre Plantée" |
| *Nages* | Prehistoric fortification: "Les Castels" |
| **Haute-Garonne:** | |
| *Aurignac* | Cave of Aurignac |
| *Bagnères-de-Luchon* | Alinements |
| | Cromlech |
| *Marsoulas* | Cave of Marsoulas |
| **Gironde:** | |
| *Bellefond* | Dolmens |
| *Marcamps* | Cavern of Pair-non-Pair |
| *St. Sulpice de Faleyrens* | Menhir de Pierre-fitte |
| *Les Salles* | Dolmen de Puy-Landry |
| **Hérault:** | |
| *Minerve* | Dolmen and tumulus of Bois bas |
| | " de Bruneau |
| *Saint-Privat* | " du Belvédère |
| *Saumont* | " de Coste-Rouge |
| **Ille-et-Vilaine:** | |
| *Cuguen* | Menhir: "la Pierre Longue" |
| *Dol* | " du Champ Dolent |
| *Essé* | Dolmen: "la Roche aux Fées" |
| *Médréac* | Alinements |
| | Menhir de Chinot |
| *Noyal-sous-Bazouges* | " de Lande Ros |
| *Pleugeur* | " : "la Pierre du Domaine" |
| *St. Aubin-du Cormier* | Menhirs (five) in the forest of Haute-Seve |
| *Saint-Suliac* | Menhir: "la Dent de Gargantau" |
| *Tressé* | Dolmen: "la Maison des Fées" |
| *St. Germain-en-Coglès* | " du Rocher Jacquiaux |
| **Indre:** | |
| *Bagneux* | Dolmen: "la Pierre Couverte de Buc" |
| | Menhir: "la Pierre levée de Boisy" |
| | Menhirs (two) at Trefoux |
| *La Châtre-Langlin* | Dolmen de Passe-Bonneau |

INDRE:

| | |
|---|---|
| *Ciron* | Dolmen de Senevant |
| | Cromlech de Senevant |
| *Hourdoueix-St. Michel* | Dolmen du Bois-Plantaise |
| *Montchevrier* | Dolmen |
| *Moulins* | " de la Pierre |
| | Cromlech de la Pierre |
| *Orsennes* | Dolmen de Chardy |
| *Parnac* | " " l'Aire aux Martes |
| | " des Gorces |
| *Saint-Plantaire* | " : "la Pierre à la Marte" |

INDRE-ET-LOIRE:

| | |
|---|---|
| *Auzouer* | Menhir du Château de Pierrefitte |
| *Balesmes* | Dolmen: "Chillon du Feuillet" |
| *Beaulieu* | Cromlech à la Croix Bonin |
| *Beaumont-la-Rouce* | Dolmen: "la Pierre levée" |
| *Draché* | Menhir: "la Pierre percée" |
| *Ferrière-l'Arcon* | Polishing stone |
| *Ligré* | Dolmen |
| *Mettray* | " : "la Grotte aux Fées" |
| *Paulmy* | " : "Pierre chaude" |
| *Petit-Pressigny* | Polishing stone |

ISÈRE:

| | |
|---|---|
| *Decines* | Menhir |

JURA:

| | |
|---|---|
| *Fontenu* | Palafittes de Chalain |
| *Montmirey-la-Ville* | Camp préhistorique du Mont-Guerin |

LOIRE-ET-CHER:

| | |
|---|---|
| *Arcines* | Menhir d'Huchigny |
| *Brevainville* | Dolmen: "les Grosses Pierres" |
| *La Chapelle Vendomoise* | " : "la Pierre levée" |
| *Droue* | Polishing stone: "La Pierre cochée" |
| *Huisseau-en-Beauce* | Menhirs (two) |
| | Dolmen |
| | Polishing stone |
| *Nourray* | Dolmen under tumulus |
| | Polishing stone |
| *Noyers* | Menhir: "La Pierre frite de Grandmont" |
| *Soings* | Tumulus |
| *Tripleville* | Menhir |
| | Dolmen |
| | Polishing stone |

| | |
|---|---|
| LOIRE: | |
| *Villerest* | A prophyry wall: "Château Brulé" |
| *Luricq* | Dolmen de Roche Cubertville |
| HAUTE-LOIRE: | |
| *Chomelix* | Menhir: "La Pierre plantée" |
| *Langeac* | Dolmen (destroyed) |
| *Saint-Eble* | " :"las Tombas de las Fadas" |
| *Vieille-Brioude* | " (destroyed) |
| LOIRE-INFÉRIEURE: | |
| *Le Croisic* | Menhir-signal |
| *Donges* | " de la Vacherie |
| *Pont-Château* | " :"le Fuseau de la Madeleine" |
| *Pornic* | Dolmen under tumulus |
| *Saint-Nazaire* | " (trilithe) |
| | " under tumulus of Dissignac |
| *Ste.-Pazanne* | " :"la Salle des Fées" |
| LOIRET: | |
| *Chevannes* | Menhir |
| *Epieds* | Dolmen |
| *Erceville* | " :"la Pierre clouée" |
| LOT: | |
| *Assier* | Dolmen |
| *Gramat* | " |
| *Limogne* | " |
| *Livernon* | " |
| LOT-ET-GARONNE: | |
| *Fargues* | Dolmen |
| LOZÈRE: | |
| *Auxillac* | Dolmen de Chardonnet |
| *Balsieges* | " " Changefége |
| *Pelouse* | " |
| *Marvejols* | " |
| MAINE-ET-LOIR: | |
| *Bagneux* | Grand dolmen |
| | Dolmen: "la Petite Pierre couverte" |
| | Menhir: "la Pierre longue" |
| *Charcé* | Dolmen |
| | Cromlech |
| *Coron* | Menhir: "la Pierre aux Hommes" |
| *Mire* | Dolmen: "la Maison des Fées" |

MAINE-ET-LOIR:

| | |
|---|---|
| *Montreuil-Bellay* | Menhir: "la Pierre de Cessay" |
| *Pontigne* | Dolmen: "Pierre couverte" |
| *St. Germain-sur-Maine* | Menhir: "la Haute-Borne" |
| *St. Hilaire St. Florent* | Dolmen du Bois Briand |
| *Soucelles* | " : "la Pierre Cesée" |

MANCHE:

| | |
|---|---|
| *Bretteville* | Dolmen |
| *Flamanville* | " (destroyed) |
| *Maupertus* | Menhir |
| *Les Moitiers d'Allonue* | Allée couverte |
| *Rocheville* | Allée couverte de la Petite Roche |
| *Vauville* | " " : "la Pierre Pouquelée" |

MARNE:

| | |
|---|---|
| *Barbonne Fayel* | Dolmen under tumulus |
| *Congy* | Menhir de l'etaing de Cheuevry |
| *Cramant et Oisy* | " |
| *Fontaine Denic* | Dolmen de Nuisy: "les Pierres de Ste. Genevieve" |

HAUTE-MARNE:

| | |
|---|---|
| *Fontaine-sur-Marne* | Menhir: "la Haute-Borne" |
| *Vitry-les-Nogent* | Dolmen au Bois de Lardigny: "la Pierre Alot" |

MAYENNE:

| | |
|---|---|
| *Bazangers* | Menhir de la Hune |
| *Ernée* | Dolmen de la Couterie |
| *Montenay* | Polishing stone: "la Pierre St. Guillaume" |
| *Le Pas* | Menhir de St. Civière |
| *Sainte-Suzanne* | Dolmen des Erves |
| *Montaudin* | Menhir de la Broussardière |

MERTHE-ET-MOSELLE:

| | |
|---|---|
| *Bois l'Evêque* (Toul) | Dolmen |
| *Pierre-la-Treiche* | Caves: "Trous de Ste. Reine" |
| *Pont-à-Mousson* | Menhir: "la Pierre au Jo" |

MEUSE:

| | |
|---|---|
| *St. Mihiel* | Menhir: "la Dame Schonne" |

MORBIHAN:

| | |
|---|---|
| *Arzon* | Dolmen du Petit Mont |
| *Baden-Arzon* | Double Cromlech d'Er Lanic |
| *l'Ile aux Moines* | Cromlech |
| *Gavr' Inis Baden* | Tumulus with dolmen |

MORBIHAN.

| | |
|---|---|
| *Belz* | Dolmen à galerie de Kerlueen |
| *Carnac* | Alinements of Ménec |
| | " " Kermario |
| | Dolmen of Kermario |
| | Alinements of Kerlescan |
| | Tumulus-dolmen of Mont-Saint-Michel |
| | Tumulus with menhir of Moustoir Carnac |
| | Dolmens of Keriaval |
| | Tumulus with three dolmens of Massé-Kerioned |
| | Menhir of Kerluhir |
| | " " Kergo |
| | Dolmen de la Madeleine |
| | " du Roch Feutet |
| | Menhir du Bourg de Carnac |
| | " de Kerlagate |
| | Dolmen de Klud-er-Yer |
| | " " Kerifol |
| | Tumulus de Crucuny |
| | Menhir de Kerderf |
| | Quadrilateral of Manio |
| | Menhir du Manio |
| *Contivy* | Sepulture of the Iron Age |
| *Erdeven* | Alinements |
| | Dolmen du Mané Gro'h |
| *Erdeven* | Three dolmens of Mane Bras |
| *Locmariaquer* | Dolmen under tumulus of Mané-er-Hroek |
| | " " " " Mané Lud |
| | Grand menhir |
| | Dolmen des Pierres Plates |
| | " de Kerveresse |
| | " : "Table des Marchands" |
| | " of Mané Rutual |
| *Locoal Meudon* | Allée couverte coudée de Mané-er-hoh |
| | Grand dolmen with gallery and mural engravings |
| | Lateral of Mané-er-hoh |
| | Dolmen with lateral chambers de Lacquelos |
| *Plougoumelen* | Dolmen du Rocher |
| *Plouharnel* | " under tumulus of Rondosec |
| | Alinement du Vieux Moulin |
| | Téte des Alinements de Ste.-Barbe |
| | Dolmen de Crucuno |
| | Cromlech de Crucuno |

| | |
|---|---|
| MORBIHAN: | |
| | Dolmen de Kergavat |
| | " " Runesto |
| | " " Gohquer |
| | " du Mane-Runmeur |
| *Quiberon* | Menhir du Mané-Meur |
| | Dolmen du Couquet |
| | Roche du Roc Priol |
| *St. Pierre Quiberon* | Cromlech de St. Pierre |
| | Tumulus à coffret de Mané-Decker-Noz |
| | Dolmen de Roch-eun-Aud |
| | " du Port-Blanc |
| *La Trinité-sur-Mer* | Alinements of the Petit-Ménec |
| | Dolmen under tumulus of Kermarquer |
| NORD: | |
| *Cambrai* | Two menhirs: "Pierres jumelles" |
| *l'Ecluse* | Menhir: "la Pierre au Diable" |
| *Hamel* | Dolmen |
| *Sars-Poteries* | Menhir: "la Pierre de Dessus bise" |
| *Sobre-le-Château* | Two menhirs: "les Pierres Martines" |
| OISE: | |
| *Trye-le-Château* | Dolmen: "la Pierre trouée" |
| *Villers-Saint-Sepulcre* | " "la Roche aux Fées" |
| ORNE: | |
| *Crameuil* | Menhir: "l'Affiloir de Gargantua" |
| *Joué du Bois* | Dolmen: "La Pierre aux Loups" |
| | " de la Grandière |
| | Menhir des Outres |
| *Silly-en-Gouffern* | " : "la Pierre levée" |
| PAS-DE-CALAIS: | |
| *Tresnicourt* | Dolmen: "la Table des Fées" |
| *Mont St. Eloy* | Two menhirs: "les Pierres jumelles" |
| *Sailly-en-Ostremont* | Cromlech des sept Bonnettes |
| PUY-DE-DÔME: | |
| *Champeix* | Dolmen "la Pierre fichade" |
| *Cournols* | " de la Grotte |
| *Davayat* | Menhir |
| *St. Germain-près-Herment* | Dolmen de Farges |
| *Saint-Gervazy* | " : "l'Usteau de Loup" |
| *Saint-Nectaire* | Dolmens |

| | |
|---|---|
| **Basses-Pyrénées:** | |
| *Bilheres* | Cromlech |
| *Buzy* | Dolmen: "le Calhau de Teberno" |
| **Hautes-Pyrénées:** | |
| *Aventignan* | Cave of Gargas |
| *Bartrès* | Dolmen |
| *Bize-Nistos* | Dolmen |
| **Pyrénées-Orientales:** | |
| *Arles-sur-Tech* | Dolmen |
| *Banyuls-sur-Mer* | " |
| **Haute-Saône:** | |
| *Traves* | Menhir percé |
| *Aroz* | " : "Pierre percée" |
| **Saône-et-Loire:** | |
| *Broye* | Menhir |
| *La Chapelle-sur-Brancion* | " : "Pierre levée" |
| *Dezize* | Dolmens of Mont-de-Senne |
| *Rully* | Camp de César, or d'Agneux |
| *Saint-Pantaleon* | Three menhirs of the Alinements of the "Champ de la Justice" |
| **Sarthe:** | |
| *Duneau* | Menhir: "la Pierre fiche" |
| | Dolmen: "la Pierre couverte" |
| *Le Mans* | Menhir by the cathedral: "Pierre de St. Julien" |
| **Savoie:** | |
| *Lans-le-Villard* | Pierre à cupules: "Pierre de Chantlouve" |
| | " " " "Rocher aux Pieds" |
| *Macot* | Dolmen de Nantfrozin |
| **Haute-Savoie:** | |
| *Les Allinges* | Sculptured erratic block |
| *Authy* | Pierre à cupules: "Pierre du Sacrifice" |
| *Reignier* | Dolmen: "la Pierre aux Fées" |
| *Saint-Cergnes* | " "la Cave, or Chambre aux Fées" |
| *Sciez* | Pierre à cupules |
| **Seine:** | |
| *Clamart* | Menhir: "la Pierre aux Moines" |

SEINE-ET-MARNE:

| | |
|---|---|
| *Beauthiel* | Menhir: "la Pierre-fitte, or Pignon de St.-Aubierge" |
| *Diant* | Menhir: "la Pierre aux bouteaux" |
| *Dormelles* | " "la Roche plantee" |
| *Ecuelles* | " "la Pierre droite" |
| *Faignes* | Polishing stone |
| *Nanteau* | Menhir: "la Pierre clouée, or Pierrefitte" |
| *Paley* | " "la Pierre qui fuit" |
| *Rumont* | Dolmen: "la Pierre l'Ormeille" |
| *Souppes* | Group of polishing stones |
| *Thoury-Ferrotte* | "la Pierre Cornoy" |

SEINE-ET-OISE:

| | |
|---|---|
| *Anvers-St. Georges* | Dolmen |
| *Boussy-Saint-Antoine* | Menhir de Pierrefitte |
| *Bruony* | Menhirs on the Thalma property |
| *La Briche* | Polishing stone |
| *Cergy* | Menhir: "la Pierre fouret," at Genay |
| *Epône* | Dolmens |
| *Montreuil-sur-Epte* | Dolmen de Coppieres |
| *Morigny-Champigny* | Polishing stone |
| *St. Leger-en-Yvelines* | La Pierre Ardrone |
| *St. Martin-du-Tertre* | Dolmen: "la Pierre Turquaise" |
| *Vigneux* | Menhir: "la Pierre à Mousseaux" |
| *Villeconin* | Polishing stone of the Bois de la Charmille |
| *Villeneuve-le-Roi* | Menhir: "la Pierre-fitte" |

DEUX-SÊVRES:

| | |
|---|---|
| *Bougon* | Dolmen: "la Pierre-levée" |
| *Celles-sur-Belle* | Three menhirs |
| *Limalouges* | Dolmen: "la Pierre-pese" |
| *St. Aubin-de-Bobigné* | Roches gravées de la Vaulx |

SOMME:

| | |
|---|---|
| *Assevillers* | Polishing stone |
| *Doingt* | Menhir: "la Pierre de Gargantua" |
| *Eppeville* | " "la Pierre qui pousse" |

TARN:

| | |
|---|---|
| *La Bastide-Rouairoux* | Dolmen |
| *Lacaune* | Menhir |
| *Roussayrolles* | Dolmen |
| *Sainte-Cecile-du-Cayreu* | " du Verdier |

| | |
|---|---|
| TARN-ET-GARONNE: | |
| *Sept-Fonds* | Dolmen |
| VAR: | |
| *Cabasse* | Menhir de Champdumy |
| *Dragnignau* | Dolmen |
| *Roquebrune* | " de la Gaillard-sur-Mer |
| *St. Raphael* | Menhir à Aire-Peyrone: "Pierre levée" |
| VAUCLUSE: | |
| *Menerbes* | Dolmen de la Pichonne |
| VENDÉE: | |
| *Avrillé* | Nine menhirs and one "Pierre branlante" |
| *Croix de Vie* | Menhir de la Tourelle (in the cemetery) |
| *Le Bernard* | Dolmen de la Frébouchère |
| *Ile d'Yeu* | Three dolmens |
| | Menhir |
| *Noirmoutiers* | Submerged "Dolmen de la Table" |
| | Ruined dolmen de "l'Herbaudière" |
| *Olonne* | Menhir de la Couche verte, in the forest of the domain of Retz |
| VIENNE: | |
| *Aslonne* | Dolmen at Lavaire |
| | Cromlech at Lavaire |
| *Availles-Limousine* | Menhir: "la Pierre-fade" |
| *Bournand* | Allée couverte: "la Pierrefolle" |
| *Lathus* | Dolmen near Marchain |
| *Naintré* | Menhir du Vieux Poitiers |
| *Neuville-du-Poitou* | Dolmen: "la Pierre-levée-de-Bellefoye" |
| *Poitiers* | " "la Pierre levée" |
| *St. Pierre-les-Eglises* | Cave of Gioux |
| HAUTE-VIENNE: | |
| *Cieux* | Menhir near Ceinturat |
| *St. Laurent-sur-Gorre* | Dolmen: "la Pierre levée" |
| *St. Leger-Magnazeise* | Polishing stone: "Le Peulvau de Scjotte" |
| VOSGES: | |
| *Escles* | Menhir |
| *Remiremont* | Two menhirs: "Pierres-fittes" |
| YONNE: | |
| *Aillant-sur-Tholon* | Menhir limite: "la Pierre-fide" |
| *Blagny-sur-Carreau* | Dolmen |
| *Courgenay* | Polishing stone of the Bois du Fauconnier at the place called "Les Roches" |

YONNE:

| | |
|---|---|
| *Egriselles-le-Bocage* | Menhir: "la Pierre Aigue" |
| *St. Maurice-aux-Riches Hommes* | Dolmen de Lancy |
| *Les Sieges* | Menhir: "la Pierre à colon" |
| *Sognes* | " du "Pas Dieu" |
| *Vaumort* | Menhir "la Pierre enlevée" or "la Pierre-aux-Sorciers" |

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